1817
XLIV

FLIGHT

and The AIRCRAFT ENGINEER

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OFFICIAL ORGAN OF THE ROYAL AERO CLUB

OCTOBER 21st, 1943

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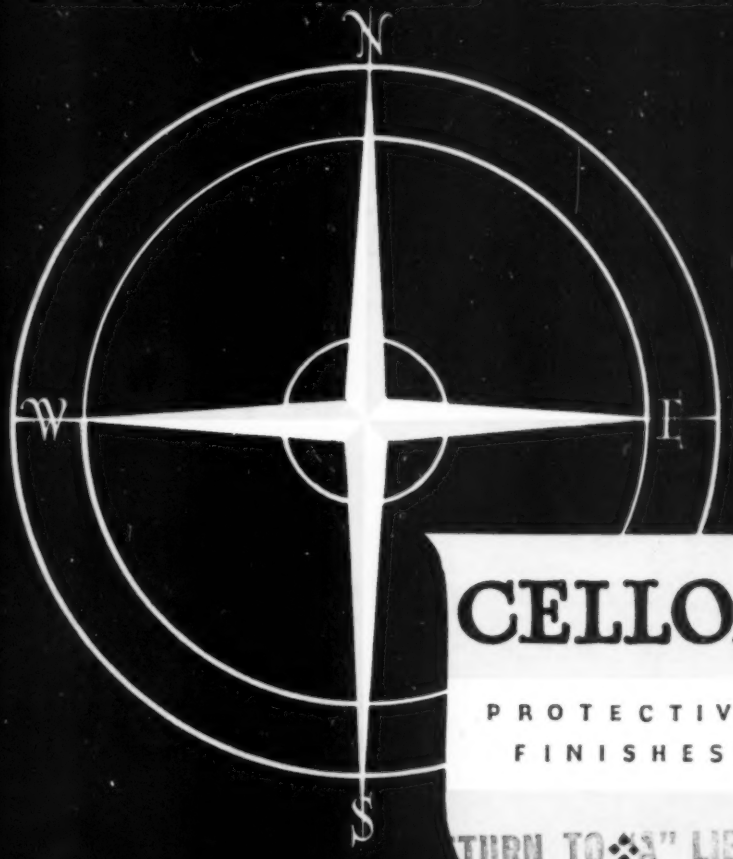

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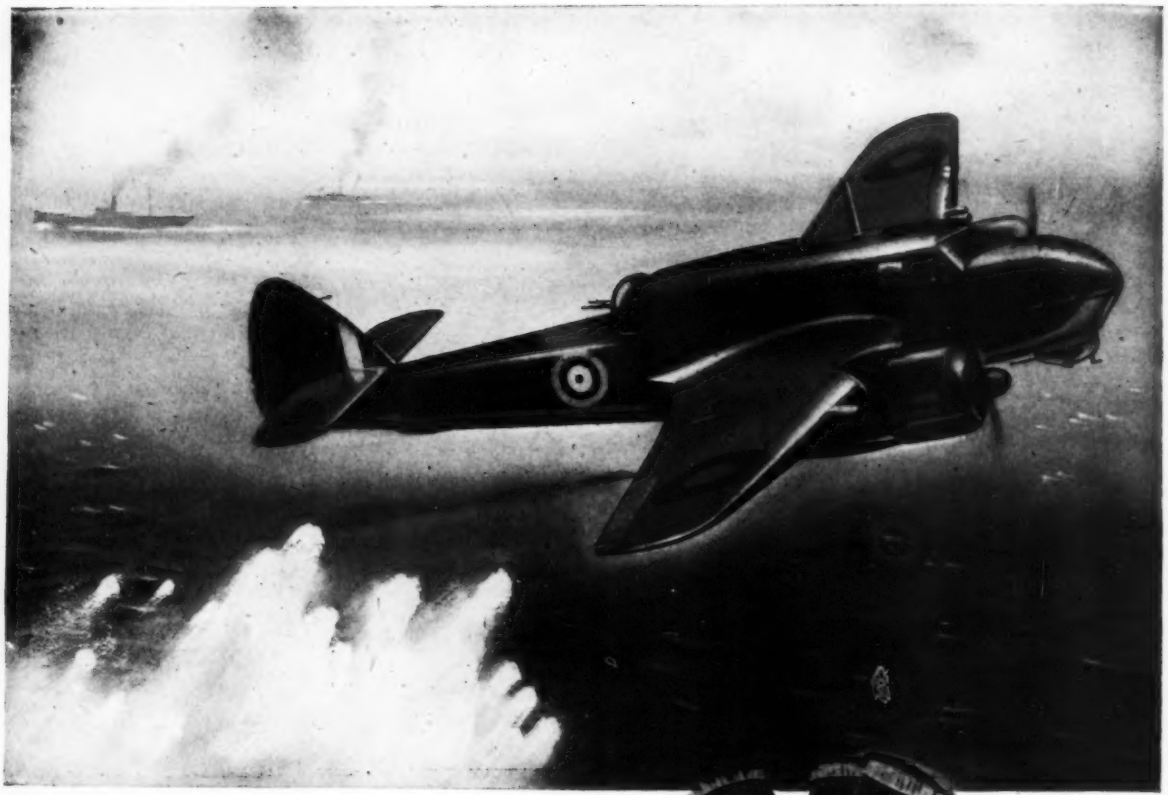

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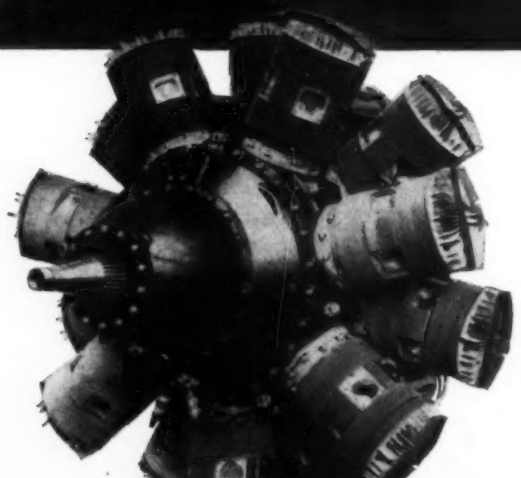
"Bristol"

TAURUS

SLEEVE-VALVE AERO-ENGINES



FLIGHT
and
The AIRCRAFT ENGINEER

FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

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The Outlook

The Azores

IN the Battle of the Atlantic Iceland has been of inestimable use to the naval and air forces of Britain and the United States, and most probably the bases leased to the United States in Greenland have also been useful, though less has been heard of them. But to the south of the routes mainly followed by the convoys between North America and Europe there has hitherto been a most inconvenient lack of bases and ports of call. Much of that inconvenience will be removed by the agreement with our oldest ally, Portugal, permitting British forces to make use of the Azores.

The alliance between Britain, or rather England, and Portugal is outstanding among international agreements. The Prime Minister reminded Parliament that it dates from the reigns of King Edward III and King Ferdinand and Queen Eleanor of Portugal. It is interesting to recall that the first European to visit India in historical times was the Portuguese, Vasco da Gama, and that Portugal still owns the territory of Goa to the south of Bombay. During the South African war our treaty with Portugal was invoked to permit British troops to land at Delagoa Bay; and during the first world war Portuguese troops fought in France. Permission to use the Azores in the second world war is the latest expression of the value of this centuries-old alliance.

In the Battle of the Atlantic the Royal Navy and Coastal Command work so closely together that what benefits one must also be to the advantage of the other. Whether the facilities of the Azores will be of more use to His Majesty's ships or to His Majesty's aircraft cannot be definitely stated, and in any case hints which might enlighten the enemy would be injudicious. The airfield at Horta is not extensive, though it may be capable of improvement, and the various harbours which have been used by commercial flying boats are not sheltered from all winds. Those facts are known to everybody. Incidentally, the islands are some 1,500 miles from the nearest German base at Bordeaux.

A base which is not quite ideal may be of tremendous use on occasions. The use of the Azores may well bring more death-dealing aircraft into play over stretches of the Atlantic, both to the north and to the south, which have hitherto been only covered with extreme difficulty. This new base may perhaps make it possible to withdraw some of the new escort carriers from the Atlantic, and we have seen recently that good use can be found for such craft in the Mediterranean. When the time comes for an advance against Japan in Burma and the Pacific the more carriers we can bring into action, the better our chances will be.

The Silent Service

THE Worshipful Company of Gold and Silver Wyre Drawers and its Master, Sir George Wilkinson, have taken the lead of all civilian bodies in doing honour to a branch of our fighting forces about which far too little is known by the general public—to wit, the Fleet Air Arm, or, as it is coming to be called once more, the Royal Naval Air Service. Officers representing that Service were entertained by Sir George at a luncheon in the City last week, and a distinguished company was present to honour them.

The Royal Navy has always prided itself on being the Silent Service, though whenever a ship is mentioned in an Admiralty communiqué, the name of the captain is always given. But, on the whole, the Navy thinks in terms of ships rather than of personalities, and so, though the names of the *Ark Royal* and the *Illustrious* are household words, those of the pilots and observers who do the actual work for which these ships have been designed are rarely known.

The Air Ministry has, since the present war began, grown free with the mention of the names, not only of fighter aces, but also of members of bomber and flying boats' crews. The public appreciates that touch of human interest in the stories which are published. The Admiralty has not followed suit, still sticking to the custom of mentioning only the name of the captain of each carrier concerned.

In replying to the toast at the luncheon, Comdr. R. A. Brabner, D.S.O., D.S.C., M.P. (who was in the air when his carrier, H.M.S. *Eagle*, was sunk), pointed out that, while the names of many R.A.F. pilots are familiar, probably not a single naval pilot was known to the public. Certainly it does not seem right that that should be so. Comdr. Brabner went on to mention "Bill Lucy" and "Bill Taylor," but they are only two among a great band of gallant men. The things those two did make the blood run faster, and we should like to hear from the Admiralty a great many more stories of the same sort.

An official booklet on the Fleet Air Arm is shortly to be published, and perhaps it will tell a number of these stories; but mentions in books do not take the place of mentions in the Press. Both are needed.

Armies and Air

HOW complete air supremacy makes it possible for a comparatively small Army to land at an anticipated point and make good its landing in the teeth of greatly superior enemy forces is the main text of the article in this issue by John Yoxall, who has recently visited the Mediterranean as special correspondent for *Flight*.

It might be argued that complete supremacy in any major arm would have a similar effect, but, however that may be, the point is that the supremacy must be complete. Mere superiority is not enough. In the fighting round Salerno the *Luftwaffe* was in no condition to contest the mastery of the air held by the Royal Air Force and Fleet Air Arm. That mastery had been obtained by Allied fighters, helped by the fragmentation bombs which had destroyed so many scores of enemy aircraft on the ground. But the main work was done by the Allied fighters, and most of it had been done before the Allies landed in Italy, or even in Sicily. The fighter aircraft is, in fact, the key pin on which all air work in collaboration with an Army depends. Once the fighters have made the air safe for their own bombers, the latter can spread destruction pretty well as they like.

The Germans, when preparing for this war, underestimated the importance of the fighter in land warfare. Originally they regarded it as a mere counter to bomber raids, and their fighters end where they began, as home defence weapons.

Above all, as a senior officer said to our correspondent, the proper co-ordination of the three Services means that their powers are multiplied and not just added. It was the Eighth Army which worked out the proper co-ordination of land and air during its desert campaigns, and that Army, not the German methods in Poland and France, has provided the New Model (to use Cromwell's phrase) for the future.

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ON THE SPOT: The amazingly accurate bombing by U.S.A.A.F. Fortresses of the Focke-Wulf factory at Marienburg, south-east of Danzig. On the left is a reconnaissance photograph showing how all the bombs fell in the target area and completely destroyed the 100-acre factory.

WHOOPS DEARIE : A Hurricane, which tried to land too fast on H.M.S. *Argus*, caught in the safety nets as it went over the side.

WAR in the AIR

The Azores Agreement : Italy at War with Germany : Smashing Attack on Rabaul : The Volturno Battle

IN the last week or so big news has come in thick and fast. First we heard of the heroic attack by British midget submarines on the German battleship *Tirpitz;* then of the agreement with Portugal about the use of the Azores; and then of Italy's declaration of war on Germany.

The exploit of the British submarines almost prompted a commentator on the air side of the war to exclaim that for this week the Navy had monopolised the limelight. Certainly the heroism of the sailors ranks with the bombing of the Maastrict bridges and all the other outstanding acts of gallantry in this war, but none the less it was not divorced from all connection with the air side of the war. In the first place it was aircraft which discovered the position of the *Tirpitz*, and considerable risks were run by the reconnoitring aircraft of Coastal Command which supplied the information. Secondly, the attack on the greatest German battleship linked up with the air attack on Bödo which followed not long afterwards. The American carrier which made this attack was escorted and guarded by British battleships and other warships, but Admiral Sir Bruce Fraser must have had his anxieties much lightened by the knowledge that the most powerful unit of the German fleet could not come out against him.

That old friend of the R.A.F., the *Scharnhorst*, is lying somewhere in the Norwegian fjords, as well as the two surviving "pocket battleships," the *Lutzow* and the *Admiral Scheer;* but without the *Tirpitz* to lead them they would certainly never attempt to tackle the Home Fleet. That other old friend of the R.A.F., the *Gneisenau*, is believed to be out of the line for the duration, though we cannot say whether the damage to her was wrought by the R.N. or the R.A.F.

Permission to use the Azores must be a big step forward in the Battle of the Atlantic. It will help in guarding several of the convoy routes between the new World and the Old, and in particular that which leads to Gibraltar and the Mediterranean. Whether it will be possible to operate heavy bombers from the airfield at Horta cannot yet be stated with certainty, but many urgent works can be carried through in war which would cause much shaking of heads in time of peace. If British engineers do enlarge and improve that airfield then the importance of the islands will be enhanced. Portugal will profit by her friendly action, and will deserve all that she gets.

Italy's declaration of war on Germany is also welcome, and will affect both the land and sea side of the war. The surrender of the Italian fleet under the Armistice terms had already settled the naval side of the struggle in the Mediterranean. The Italian troops and airmen have for some time past done no more fighting than they were obliged to do, either against the Allies or against the Germans. Not much could be expected from them when they were in the equivocal position left by the Armistice terms, which found them already in a state of depression and war-weariness. Whether they will now respond to Marshal Badoglio's orders to "fight against the Germans to the last man" remains to be seen. There are undoubtedly many fine pilots and brave men in the *Regia Aeronautica*, and

WAR IN THE AIR

they will almost certainly be happier fighting beside the British than they were when on the other side. If we lend them some Spitfires they will probably reach the seventh heaven of delight.

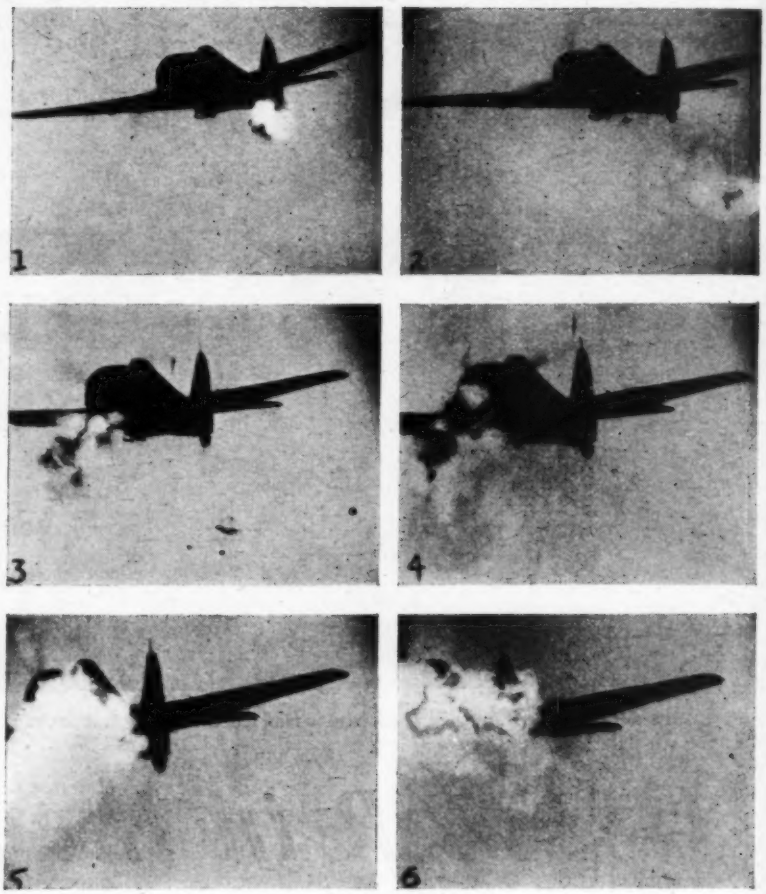
In the Indian Ocean

THE Japanese are obviously getting nervous about British intentions now that the campaigning season is approaching and Admiral Mountbatten has arrived in Delhi. This is shown by the way their reconnaissance aircraft have been poking their noses out across the Indian Ocean, probably from the Andaman Islands. One Japanese machine was recently destroyed off Ceylon, while another ventured over Madras and actually dropped a bomb or two. These bombs caused slight casualties and no damage. A bomb dropped in the thickly populated Indian quarter known as Georgetown round the harbour could scarcely fail to hurt somebody. Since Clive sailed from Madras to Calcutta to fight the battle of Plassey, Madras has seldom heard shots fired in anger. In 1914 the raider *Emden* bombarded some oil tanks in the city, but was driven off by unexpected fire from a shore battery.

Rabaul Smashed Up

GENERAL MACARTHUR is a man not lightly given to making statements in the superlative, and when he says that the Japanese have suffered "a crushing and decisive defeat" and that the back of Rabaul has been broken and the whole of the Japanese defences imperilled, one may feel sure that he feels that there are good grounds for his exultation.

FOR HEAD-ON ATTACKS : The new twin .5in. Emerson electrically operated turret being fitted to a Consolidated Vultee Liberator at Fort Worth.



STERN CHASE : The end of an FW 190 as seen by the attacking pilot in a Hawker Typhoon.

In his official report the Allied commander criticises the Japanese strategical arrangements, by which their forces were divided up into two groups, at Wewak and Rabaul, which permitted him to apply his full force against each of them in turn. Wewak was dealt with some time ago, and last week the full air power of the Americans and Australians was hurled at Rabaul. As usual, General MacArthur used his air arm as his main striking force—in fact, in this Rabaul affair there has been no suggestion that any but air forces were used. He made a surprise attack by daylight, using every sort and description of aircraft that could carry a bomb. The surprise doubtless lay in the fact that Rabaul had not been raided by day since last January.

The attack went on for two hours, and the enemy was only able to get 40 fighters into the air. They were a forlorn hope, and 26 of them were shot down. What the other 14 did we are not told; they could hardly have thought it safe to land near Rabaul where the airfields were being bombed and shot up with the greatest fury. It is said that in all 177 Japanese machines were destroyed, and that in itself must be a very crippling blow. In addition 120 ships, including three warships, are reported to have been lost to the enemy, and shipping is the Achilles' heel of Japan. The Japanese armies in the lands which they have overrun must all be supplied by sea. The soldiers may be able to live on the rice which they commandeer in the occupied countries, but they cannot find ammunition growing in the *padi* fields. If the enemy armies in the islands are to be kept supplied, more ships must be found to replace those destroyed, and at the same time the Japanese Generals in Burma are probably stressing their needs in view of the imminence of a forward move by Lord Louis Mountbatten. Some supplies can reach Burma overland, through Indo-China and Siam, but communications that way are not good, and the sea is the natural way by which to keep Burma supplied.

The Volturno Battle

A BREAK in the period of rainy weather, which had restricted Allied air activity and had caused the Volturno river and its tributaries to

WAR IN THE AIR

ENEMY AIR LOSSES TO OCT. 16th

	Over G.B.	Continent	Middle East	N.W. Africa
Oct. 10	0	0	0	6
" 11	0	0	0	0
" 12	1	0	0	0
" 13	0	1	0	2
" 14	0	0	0	4
" 15	5	1	0	6
" 16	0	2	0	8
	6	4	0	26

Totals: West, 7,618; Middle East, over 5,724; North West Africa, 3,446.

overflow their banks, gave a chance to the Fifth Army to launch its attack on the German lines. As the flood water flowed away, the enemy naturally expected an assault on the river line, and made clever preparations to meet it. The reconnaissance aircraft of the Tactical Air Force carefully reported the German dispositions, and when the Fifth Army began to cross the river, Invaders dive-bombed the positions where the enemy had massed for counter-attacks, and so hammered them that these counter-attacks lost most of their sting.

The Invader, we may remind our readers, is a version of the Mustang fighter, and is fitted with diving brakes. Perhaps it cannot dive quite so steeply as a Stuka can do, and it certainly cannot carry such a heavy bomb load, but it does not suffer from the same weak points as the Ju 87. It is essentially a fast fighter, and when it has got rid of its bombs it can very well look after itself. Moreover, on the Volturno the Invaders were not opposed by strong forces of German fighters, and they were able to carry out their mission with little opposition except from ground fire.

It is worthy of note that the true American dive-bomber, the Vengeance, has not been mentioned as present on any of the European fronts, though it has been actively employed in Burma against the Japanese. Presumably, the Vengeances there are the machines ordered by the Air Ministry in June, 1940, when the fighting in France had filled everyone with the idea that one must have dive-bombers if one was to hold one's own. However, the Invaders seem to have done quite useful work in Italy.

TO THE POINT: One of our latest Spitfires being refuelled on Taranto airfield. The four-bladed airscrew presupposes a Merlin 61 engine and the wing tips are much more pointed than those on the standard Spitfire.

BRITISH & U.S. AIR LOSSES TO OCT. 16th

	Over G.B. A'crft.	Continent B'brs.	Continent F'trs.	Middle East A'crft.	N.W. Africa A'crft.
Oct. 10	0	30	2	0	2
11	0	0	0	0	0
12	0	0	0	1	0
13	0	0	0	0	1
14	0	60	2	0	2
15	0	0	0	0	3
16	0	0	0	0	0
	0	90	4	1	8

Totals: West, 8,128; Middle East, about 2,289; North West Africa, 1,292.

Luftwaffe in Italy

IN the early stages of the battle of the Volturno the Germans kept to their policy of holding back the *Luftwaffe*, doubtless for two reasons, first that the terrain was so difficult for the advancing Allies that they felt that their ground troops ought to be able to hold out without much air support, and secondly because aircraft have now become so precious that they do not want to risk losing more than is absolutely necessary. But as the British and Americans threw more and more bridges across the river, the Germans at last decided that something would have to be done about it. So bombers were sent against the bridges, but were not able to overcome the opposition of ground fire and fighter supremacy. Not a bridge had been destroyed up to the time of writing, and the German losses in aircraft were far from light.

The American Eighth Air Force made its greatest raid to date last week when it heavily bomber Schweinfurt and put the roller-bearing works out of action for a long time. The American losses in bombers were regrettably heavy, though their Command had expected that they would not be light, and regards the result as having justified the losses. The record of a week's losses given in the table on this page shows American losses of 94 machines. The R.A.F. did not lose a single one on the Western Front.

In Russia tremendous air battles have been going on round Kiev in spite of the marshy ground in that neighbourhood, which must affect the Russians' ability to improvise new airfields. In the fight for Nevel the Russians are reported to have made a skilful use of air power in bringing off their successful advance. All the reports which have come in agree that the *Luftwaffe* in Russia has met more than its match in the Red Air Fleet.

AMERICA'S AIR-WAR EFFORT

JUST as we are about to go to press, the U.S. Office of War Information has issued a report which contains several interesting statements, some of which disclose facts not hitherto published, while others confirm statements previously made.

Between December 7th, 1941 (the date of the attack on Pearl Harbour) and September 1st, 1943, American Army aircraft flew a total of 223,758 sorties in which they dropped a total of 105,649 tons of bombs. They destroyed 7,312 enemy aircraft, probably destroyed a further 2,196, and damaged an additional 2,535. Their own loss was 1,867 aircraft. For the six months ended September 1st, 1943, the figures were: Destroyed, 5,389; probably destroyed, 1,502; damaged, 1,860. American losses, 1,239.

The B29 long-range bomber, which, the report states, will be in action next spring, is referred to in some detail on page 454 of this issue. The report confirms that the Fortress, with external bomb racks and short duration, can carry 20,800 lb. of bombs. A new light bomber is said to be "three or four years ahead of the A 20 (Havoc)," and to be designed with different noses for different purposes, including the carrying of a powerful cannon.

In the fighter class an entirely new type is announced, with "greatly advanced performance," and of the new Mustang (P51), with Packard-built R.-R. Merlin, it is said that it "has the highest ceiling (up to 40,000ft.) and greatest speed (well over 400 h.p.h.) of any fighter in existence."

Also from America comes news that the Remington Arms Company has brought out a new 0.5 projectile which explodes self-sealing tanks and sets fire to the fuel.

HERE AND THERE

Parking Problem

AMERICAN heavy bombers have been pouring into this country at such a rate during the recent stepping-up process of the U.S. daylight offensive that one ferry pilot is quoted as saying:

"We have never had such activity; the only thing that worries me is where you can put them all!"

Prophetic Optimists Deplored

SAYING that he deplored the aviation "crystal gazers" 'who prophesied super-colossal airliners immediately after the war, Mr. Bedell Monro, president of Pennsylvania Central Airlines, recently voiced the opinion, at Cleveland, Ohio, that there would be no new aircraft for international air travel until four or six years after the war. As for 400-passenger aircraft—they were a long way in the future.

Fort's Chin Turret

LATEST modification to the Flying Fortress II is the introduction of a remotely controlled, power-operated "chin turret" just under the bombardier's station.

Two 0.5in. machine guns arm this new turret, which replaces the three flexible nose guns and which is expected to enhance still further the fire-power of what has occasionally been referred to as America's four-engined fighter.

Spotters' Problem

MUSSOLINI, it is reported, has ordered his Under-Secretary for Air to form a new Italian Air Force.

Assuming something of the sort is achieved, and the new force of Fascist fliers uses Italian aircraft types, it would seem that a problem in spotting will arise comparable to when Vichy and ourselves were both using Marylands in Syria.

Insignia on wings, etc., cannot always be clearly seen, and when it can it is likely to be a trifle late to do much about it.

Ninety per Cent. of Two!

OBJECTING to recommendations on post-war civil air transport included in a statement issued by a special committee of the U.S. Chamber of Commerce, Mr. John Cooper, vice-president of Pan-American Airways, is reported to have said the recommendations were "opposed to the views of 90 per cent. of the American international air transport industry."

As his own company and American Export Airlines are at present the only two U.S. concerns allowed to operate foreign routes, that "90 per cent." would appear to be a trifle misleading.

Another "Secret Weapon"

ACCORDING to a Stockholm message, Berlin has claimed that a new German fighter, firing a projectile that can blow a heavy bomber to bits with a single shot, is now in service with the *Luftwaffe*.

No mention is made, of course, of the rate of fire, which is an all-important factor in hitting the bomber at all!—even assuming the claim to be anything more than a mixture of bluff and morale propaganda for home consumption.

Science and the Camera

THE Association for Scientific Photography is holding a meeting on Saturday afternoon (October 23rd) at 2.30 p.m. at the Institution of Mechanical Engineers, when papers will be read by Mr. A. Hessell Tiltman and Mr. S. A. Woodward on "The Use of Photographically Sensitised Metal, Wood and Plastics."

Get Up Them Stairs!

NOT content with wrongly describing the Auster III as a low-wing monoplane (though every schoolboy knows better) the daily Press, which "revealed" the existence of this aircraft a week after it had been fully described in *Flight*, stated in its traditional eagerness to be dramatic at all costs, "It climbs like an escalator at 1,040 ft./min."

The figure was quite correct, but imagine (if you can!) an escalator with this meteoric rate of ascent!

Perhaps some "Underground" engineer will oblige with the actual climbing speed of an escalator?

Mr. Nelson Was Impressed

"I HAVE been very much impressed with what I have seen. There is a great sense of urgency here. That is the message I shall take back to America."

So said Mr. Donald Nelson, chairman of the U.S. War Production Board during his visit to this country after he had been shown round a Spitfire factory in the Midlands with Mr. Oliver Lyttelton, our own Minister of Production.

Mr. Nelson followed the process of manufacture right through and then witnessed a demonstration by three test pilots above the factory's airfield.

Prospects in Palestine

PALESTINE, in the opinion of Sir Douglas Harris, may well become an important centre of activity in the realm of post-war civil aviation.

"With the faster machines which will be in service after the war," he said in a recent speech on reconstruction in Palestine, "it seems not improbable that Lydda may be selected as the first night stop on the outward and the last on the inward journey for planes on the Empire routes from England to India and the Far East.

"And from Lydda one can visualise a network of feeder services by smaller machines to neighbouring Middle Eastern centres such as Cairo, Amman, Damascus, Beirut, Cyprus, Ankara and Bagdad."

U.S. Airlines' Joint Effort

SIXTEEN American airlines have formed a committee to try to gain the right to engage in international air traffic after the war; at present only Pan-American Airways and American Export Airlines are allowed to operate international air-routes, and before the war only Pan-American operated regular foreign services.

CABLE CUTTER: The small size of the cable-cutters fitted to the leading-edge of the wings of British bombers is shown in comparison with a man's hand. Several are spaced along the wing, and when the balloon cable slides into the cutter it fires a cartridge which drives a chisel and severs it instantly.

Readers will recall that in *Flight* of August 19th last it was recorded, in an article headed "Control or Competition?" that at a conference of American airline operators, sixteen had voted for free and open competition on the international routes, while Pan-American, American Export, and United Airlines advocated their being operated by a single combine.

At present nearly twice as many U.S. companies want to fly on foreign routes as now operate over the whole of the States, and the C.A.B. has received more than fifty requests for new routes, including London, Paris, Delhi, Calcutta, Chungking, Honolulu, and Tokio, as well as to Alaska and Canada.

Shrapnel Suits

A SHORT while ago it was announced that U.S.A.A.F. air crews were being issued with a newly developed type of armoured waistcoat to protect them against small fragments of shell splinter from *flak*.

So successful has this been in reducing the casualties that the idea is being adopted by the R.A.F., and further experiments carried out.

R.A.F. air crews, it is reported, have already been on "ops." with protection of this kind, which has become known in the Service as the "shrapnel suit."

Air Battle Formulæ

Air Has Become the Dominant Factor : A Close-up Picture of the Mediterranean Set-up : A Third Flank

By JOHN YOXALL

ANYONE who has visited the air forces in the Mediterranean and talked with their commanding officers, as I have done in the past few weeks, must become conscious of the tremendous effects of applied air power in modern warfare. From being an auxiliary arm to the Army and Navy, air power has, without question, become the deciding factor in land battles to-day. This does not mean that it can work entirely on its own for, as General Eisenhower himself said to me, "In the co-ordination of all three services lies not only the true secret of war but the way in which air power can be used to the maximum value."

IN this first article following his return from a flight of some 8,000 miles to and over the Mediterranean theatre of war, our representative records some of the vivid impressions of complete air mastery which the Mediterranean Air Command has established, and of the high spirits and absolute confidence which animates everyone.

The fact that the air is the spearhead of attack is realised by most. What is not generally appreciated is that the Allied air forces are the means of saving countless Allied lives rather than of destroying vast numbers of the enemy.

Without adequate air cover neither an army nor a naval force can move, and this air cover can only be given if sufficient airfields are available. It is, therefore, obvious that modern warfare can be thought of simply in terms of a series of battles for airfields. The outline is simple in the extreme. By careful selection and timing of targets for the strategic and tactical air forces the way is made clear for the army to capture and occupy airfields; from these the process is repeated. The outstanding example of this sort of "epicyclic gear" movement started at El Alamein and has rolled itself some 2,500 miles to give us vital airfields in Italy. These airfields—in conjunction with those in Britain—place the whole of Germany at our mercy and its capital within range of the daylight strategic bombers.

It has yet to be realised by the general populace what a very important victory has been won in Italy.

Coincidently with the land battles, the air forces must give cover to all the naval operations. It is only by virtue of sea power that the enormous quantities of supplies required by an army and air force in the field can be made available. It is equally true that, unless provided with an air umbrella, the navy is to-day impotent. Whether that cover is given by fighters flown off carriers or by fighters from adjacent airfields is immaterial. Its presence is absolutely necessary.

With this in mind it is interesting to recall that for the first three days after the landing on the Salerno beaches Rear-Admiral Sir Philip Vian used Seafires from the five Aircraft carriers H.M.S. *Unicorn*, *Hunter*, *Battler*, *Stalker* and *Attacker* to help the land-based fighters to maintain an air cover over the invasion fleet. The battleships *Nelson* and *Rodney* with their escorts of lighter tonnage provided the A.A., and the warships themselves received their air protection from fighters flown off the

Air Chief Marshal Tedder (left) inspecting the results of the strategic bombing of Tunis. The harbour is full of sunken Axis ships, and the quay installations are razed to the ground. The damage extends only for a quarter of a mile from the docks and the town itself is untouched.

A Supermarine Seafire alighting on the escort carrier H.M.S. *Hunter* during the Salerno landings.

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decks of H.M.S. *Illustrious* and *Formidable*. The *Luftwaffe*, however, had been so roughly handled in North Africa and Sicily that their reply was only in the way of nuisance raids, and so *we had the amazing spectacle of a land force, of less strength than that deployed by the enemy, being able to make a landing at an anticipated point and establish itself with armour, artillery and airfields. Such is air power.*

When I was at the Salerno beaches recently the enemy was only a few miles distant, with all the airfields round about Naples at his disposal. Such was our air supremacy, however, that thousands of tons of heavy equipment, men, stores and ammunition were being unloaded by thousands of troops, literally without the slightest hindrance from the *Luftwaffe*. In fact, although steel helmets were handy for immediate use if required, most of the troops were wearing soft headgear.

During the initial stages of the landing, while forward landing strips were being made under shellfire from the surrounding hills, all the Allied land-based air cover had to fly so far that it could only stay over the area for twenty minutes during each sortie, and yet—apart from the Fleet Air Arm effort—several dozen fighters were always present at any one particular time during daylight hours.

Concentration

In the course of several days' fighting, the Germans found a soft spot in the Allied line covered by an untried division. They exploited this by counter-attacking and getting within one and a half miles of the beaches. The position was very critical for a while, and to destroy this spearhead threat all available aircraft of both the tactical and strategic air forces were turned on to the nodal centres of the German attack. The result was completely successful and the attack fizzled out, never to be resumed.

Concentrations of German troops were known to be in the villages of Battipaglia and Eboli, and these became targets for concentrated air bombing by both strategic and tactical forces. The result was just fantastic, no other word can express it. In a matter of hours these places were reduced to an extent which would have taken heavy artillery months to achieve. The old idea of a crater here and another there in a road or railway must be forgotten. To get Battipaglia's railway and marshalling yard working again will mean complete reconstruction from twenty feet below the original surface of the rails; and this over an area of hundreds of acres. A perfect example of concentrated air attack.

This account, it must be understood, is entirely devoted to the power of military aircraft. We do not glory in the destruction of little people's homes. Nevertheless, bearing in mind the tonnage of bombs per acre dropped on these towns, and the tonnage per acre dropped in the concentrated raids on German towns and cities, it becomes more than apparent that air bombing has played a much greater part in the recent manifold defeats of the Axis than has been imagined hitherto. When the day and night strategic bombers based on England and Italy get going with attacks on the production centres of the enemy, even the most thick-headed German will realise that the wonderfully equipped German army of 12 million troops, which was built for world conquest, has failed and must fail in its first duty

STRATEGIC BOMBING : A junction of four roads at Castelnuovo, east of Naples, obliterated by R.A.F. and R.C.A.F. Wellingtons in a night attack. Castelnuovo was one of the main arteries of enemy supply at the time of the Salerno landings.

—the protection of its own country and people from the power of the enemy. This realisation is likely to be spectacular.

By the decisive defeat of the Luftwaffe *the Allied Commanders have been presented with a third-dimensional flank which can be turned at will.* The side which holds air supremacy and uses it in a proper manner must, in the end, prevail. In Italy to-day our road transport is free to go where it will—nose to tail and with full headlights at night while the enemy have given up using the roads in daylight and dare operate at night with black-out lights only.

So much for the broad outline of the air position as it is to-day; many of the battles and phases which have contributed to this air supremacy in the Mediterranean area provide a wealth of detail which is of vital interest. It is generally assumed that air supremacy can only be obtained by fighting innumerable air battles until the enemy has been clawed out of the sky. There is another way; by destroying aircraft on the ground. For this purpose the U.S.A.A.F. employ a particularly effective fragmentation bomb which explodes immediately on contact with the ground. This bomb makes scarcely any crater, but the casing fragments cause havoc on anything more than two feet high for a considerable radius. It weighs 20 lb. and a Boston (A20b), for instance, can carry several clusters plus high-explosive bombs. For the same purpose we employ ordinary 250 lb. bombs which have a rod extending from the nose. This rod actuates the detonator before the bomb penetrates the earth.

BREECH BLOCK: A complete trainload of 88 mm. shells destroyed by fighter-bombers of the Tactical Air Force. How many of our soldiers' lives were saved by this attack alone is impossible even to guess.

Target of Opportunity

A classic example of the use of air bombing to destroy aircraft on the ground occurred at Derna. Air reconnaissance showed that the enemy was waterlogged so we laid a carpet of bombs round his dispersal points. In a matter of minutes 63 aircraft were destroyed. When, however, we were ourselves bogged down for a while and could not use our aircraft to stop him getting troops and supplies into North Africa, the enemy missed the opportunity to attack and misconstrued the situation into a belief that he could rely on a greater percentage of material arrivals than was actually the fact. He based his strategy on this erroneous calculation, and the outcome was considerably in our favour when the final battles for Tunisia were fought.

Another outstanding example of the power of air bombing occurred in Sicily. Gerbini airfield has some 13 satellites, and it was the job of the strategic bombers to put them out of action. This was done so thoroughly that one of the northern satellites is so cratered that we cannot repair it for our own use. There is a 20-foot bomb crater every 30 or 40 yards in every direction covering the whole airfield. In between the craters are a number of more or less damaged aircraft. Even if they were in perfect condition they could not be moved for a considerable time.

It has been said with much truth that, within range from its established bases, air power is the most mobile force ever put into the field. When it becomes necessary to move the bases, exactly the reverse is the truth. This does not mean that this immobility has not been overcome. By hard work and enthusiasm some remarkable moves have been made. During the Cyrenaican phase of the campaign a Wellington group moved itself 150 miles after having been out on operations all night, and, after the move, had eight squadrons operating the following night. Fuel and bombs is an army

BOTH STRATEGIC AND TACTICAL: When the Germans gathered their forces in Battipaglia and Eboli to push the 5th Army off the beaches every available aircraft of Strategical and Tactical Commands was used to bomb the concentration. The photograph is of Battipaglia which was completely destroyed.

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AIR SUPERIORITY BY BOMBING. Hundreds of enemy aircraft have been destroyed at their dispersal points on airfields. This photograph shows a whole trainload of aircraft and engines caught when our strategic bombers pattern-bombed the railway marshalling yards at Crotone.

responsibility (the Wellington carries 600 gallons of fuel and two tons of bombs) but there is still an enormous amount of other paraphernalia to be moved if the aircraft are to remain serviceable. This Wellington group reckons to maintain 75 per cent. serviceability. This is a good figure when one remembers the operating conditions which have little betwixt and between sand storms and mud.

Another very spectacular move was one made by part of the Desert Air Force under Air Vice-Marshal Broadhurst. It has moved on again now so the story can be told without helping the enemy. A group under his command operating from the airfields in Sicily was told that it was to move to the mainland. By the aid of Dakota transports they established themselves by noon the next day. This included the transport of anti-aircraft guns for airfield protection.

First the men were flown in, then the absolutely essential equipment, which included jeeps, was landed. The whole operation was given cover by fighters of the group, and the group was fully operational the next day. A move of 250 miles was thus accomplished in the matter of a few hours. How effective the move was is illustrated by the fact that on this first operational day from their new station the group found concentrations of German road transport and destroyed 240 lorries in the one day alone. In an air move such as has been described only the absolute essentials are taken. In this case the rest of the group's equipment was packed in the remaining heavy transport which crossed the Messina Straits and made a three days' drive round the coast.

Now that the D.A.F. has completely established itself on the mainland it has reverted to its famous "leapfrog" tactics. As the Army captured airfields so the half of the D.A.F. which is farthest from the front passes over its other half, to be itself "leapfrogged" again at the next move.

An attack on Axis shipping by Coastal Command Beaufighters. During the North African campaign it was the shipping strikes of land-based aircraft which played such a big part in starving the enemy of seaborne supplies.

Airfield Construction

When one speaks of the Army capturing airfields it must be borne in mind that this may only mean land suitable for airfield construction. In this event special airfield construction units with bulldozers, graders, caterpillar tractors and other heavy equipment get to work. Grape vines or trees are pulled out and the runway graded and levelled and consolidated if necessary with waste oil or fuel oil. Given reasonably suitable terrain, three construction units of twenty men each can make a landing ground in a few hours. One unit working on its own can produce the same result in under two days. If, of course, it is decided to lay a Marston or Somerfield steel runway a good deal more time must be allowed.

The layout of the Army/Air Force organisation for handling tactical targets and "targets of opportunity" is of the highest importance, and a fine working scheme has been evolved. All requests by the Army for local air support are passed back, and, if the urgency is great enough, the attack can be effected within 20 minutes of the request being made.

To avoid the tragedy of dropping bombs on our own men a bomb line is laid out on all the maps in the operations rooms, and the position of this is checked every two

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hours. This line obviously has a certain safety limit but a secondary bomb line within the limits of the main bomb line can be given where very forward enemy positions have to be attacked. The accuracy of this plan is so good that on a few occasions bombing has been carried out effectively within 200 yards of our troops.

Gun Discipline

There have been a few cases where our own troops have been bombed and there have also been cases of misrecognition where our aircraft and gliders have been shot down by our own anti-aircraft guns. Now that we have such terrific air superiority this problem has become one of gun discipline rather than recognition. If the totals of our sorties and those of the *Luftwaffe* are compared it becomes apparent that the odds are more than 10 to 1 on that any aircraft seen in the battle area will be an Allied machine. The days of sensitive trigger fingers because of the expectation of enemy air attack are gone—the boot is now on the other foot, and it is we and not the *Luftwaffe* who have the cumulative advantage of air supremacy.

In close support work the Kittybombers and Invaders play a spectacular rôle. The Kittybomber carries two 250 lb. bombs side by side under the fuselage, and the Invader (A36) has two 500 lb. bombs in racks under the wings outside the swept disc of the airscrew. The technique of the attack is the same as that of the Typhoon bomber. That is to say a steep dive for some 4,000 ft. with a sharp pull-out and evasive action at the end of it.

In the case of the Kittybombers the dive has to be fairly shallow because they carry no bomb ejector arm to project the missiles clear of the airscrew. The Invader, however, makes its attack in the best 90-degree manner because it has hydraulically-operated slotted diving-brakes above and below the wings to limit the diving speed to 350-400 m.p.h. The bombs being outside the airscrew disc no ejector arm is required. A 90-degree dive is always difficult to attain in the ordinary manner, and the pilots find it best to peel off on to their backs from an openly spaced echelon formation. I had this demonstrated for me at Montecorvino airfield; the attack is spectacular in the extreme. The target presented to the ground defence is a small and fast-moving one and very difficult to hit.

That these fighter-bomber attacks are extremely effective is evidenced by the fact that during the early stages of the Salerno landing one wing of Kittybombers alone were putting in over 210 sorties a day. From these sorties no day passed when fewer than 50 enemy vehicles were destroyed and a further 100 damaged. This wing of Kittybombers was operating from one airfield which was within enemy artillery range and was covered by only one airborne division, which could not guarantee security. I have heard it said that the Allied High Command is not prepared to take chances!

The long-range Beaufighters have been a scourge to the Ju 52 transports by day and night. Over Corsica alone they got no fewer than 26 in two days. A Ju 52 is seen here just hitting the water after being shot down.

A motor grader levelling a runway for use by our close support aircraft. During the dry southern European summer earthen runways hastily prepared have served their purpose well.

Coastal Command

Turning now to another phase. Equally important is the continual air/sea war carried on by the Mediterranean Coastal Command, whose job it is to guard our convoys and ports and, at the same time, deny all seaborne power and supplies to the enemy. If we had not regained the Cyrenaica airfields when we did and thus enabled cover to be given to our ship convoys, Malta would have had to surrender in a very short while, the Mediterranean Sea would have been closed, and the whole of the campaign in North Africa, Sicily and Italy would never have happened. Such are the chances of war.

Another phenomenal chance—or mischance—of war occurred when Rommel had been pushed back to El Agheila the first time, in 1942. By carefully assessing the supplies known to have reached him, and comparing these with his known requirements, it was estimated that at the point where we found ourselves spent, because of long lines of communication, he had only four days' supply in hand. He did the only thing he could do. He counter-attacked with these last resources and this attack, by sheer good fortune, "came off." From the poverty of El Agheila he ran into a land of plenty as he captured dumps of our material all the way down to El Alamein. Once he was stopped at El Alamein the process of starving him out was again started—particular emphasis being laid on fuel and oil. The timing of the El Alamein attack was perfect. Rommel was so short of fuel that he tried another El Agheila on us. This time the gamble did not come off and, even had we not attacked and driven him back when we did, he must eventually have abandoned his positions because of sheer lack of fuel supplies. In desperation, because every tanker he tried to bring in was sunk, he put all his bomber aircraft on to bringing supplies of petrol from Crete. This, of course, meant that we were able to build up our strength and carry out our attack unhindered from the air.

Three times during his retreat Rommel tried to get a

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big tanker of fuel into North Africa. Three times he failed. The first two made for Tobruk and despite torpedo attacks from the air, both arrived in harbour. Coincidental with their arrival, and before unloading could start, a strike of B.24s got direct hits and destroyed the fuel. As we advanced so we found hundreds of vehicles and aircraft derelict merely from lack of fuel. Never in the history of war has the unbalancing of the enemy's supply had such a profound effect on a campaign. He might have food and guns and ammunition—without fuel and oil he was beaten.

In a last desperate attempt to get supplies in quantity a large tanker of 8,000 tons made for Benghazi. Again, like its two predecessors, it crossed the sea unscathed. This time the B.24s caught it just as it was steaming into port. It is said that Rommel himself saw it arrive and, turning, said, "There is our salvation." As he watched, the B.24s arrived and set it on fire. It burned for more than a week, and Air Vice-Marshal Sir Hugh Pugh Lloyd, who commands the Mediterranean Coastal Command, had the satisfaction of seeing it still burning when he arrived in Benghazi a few days later. The effect of this last blow was to make the enemy attempt to bring their North African supplies via Sicily and Tunis in large numbers of small ships. From Tunis they went by train to Gabes and from Gabes to the front line by lorry.

The railway was cut by air bombing and many of the ships never reached port. It must be admitted, however, that the F. lighters which he used in a final attempt to overcome his difficulties were somewhat of a headache to our air staff. They were of too shallow draught to be torpedoed, and they mounted enough *flak* to make them very hot targets for cannon attack. Despite all his artifices, however, in the final stages of the Tunisian campaign it was lack of supplies which caused the complete debacle and surrender of 400,000 troops. Mediterranean Coastal Command felt that they had done their work so well that, to use their own words, "a couple of London policemen could have finished the job." The Army and Navy would probably be prepared to dispute this, but undoubtedly it was air attack on supplies and air cover over the ships and ground forces which made the victory possible.

Anti-shipping and anti-submarine work forms only a part of the duties of the Mediterranean Coastal Command. All convoys of our ships passing through the Mediterranean are given fighter cover by day and are protected by Beaufighters at night. These Beaufighters also cover the ports in our hands and seek out enemy air transports moving in darkness. One famous squadron, whose commanding officer is the famous Wing Cdr. Paddy Green, has done great work with its Beaufighters. While operating from Malta they got 41 enemy aircraft in 31 nights over Sicily, and they already have over 15 victories in the Italian campaign. When all evacuation by ships from Corsica had been stopped, the Germans attempted to get away by Ju 52; the Beaufighters were turned on and they got 26 Ju 52s in two days. Everyone is agreed that the Beaufighter has done a great job of work in this theatre of war; it is one of the best-hated machines on the *Luftwaffe* list.

HIDE AND SEEK: Using a carpet of small bombs to blow up dispersed ammunition dumps buried in the desert.

Air/sea rescue work is the remaining duty of Mediterranean Coastal Command. It is a difficult and arduous task but it pays a good dividend. It gives our aircrews added confidence, and since our air supremacy is so great, we are also able to pick up a good proportion of the enemy crews who get shot down. This happens even when very close to their own territory. The result is cumulative and the morale of enemy aircrews has suffered considerably for this reason alone.

The next article in this series will deal with some personalities and aircraft in the Mediterranean theatre of Air Operations.

AIR SURVEY RECORD

A NEW record for aerial survey was set up in Canada, it is believed, when recently D. H. Kerns, of the Ontario Department of Lands and Forests, and T. Blaikey, of Austin Airways, Toronto, photographed in one day 950 square miles of bush country near Geraldton, Ontario.

The photographic runs were made in 50-mile strips about 1½ miles apart, using photographic film rolls 10in. wide and 75ft. long, with 110 photos being taken per roll.

The pair waited a month for favourable weather to make the runs at 11,000ft. They have been flying together for four years. The surveys are for Government use.

R.C.A.F.'s GROWING STRENGTH

IN the latest report on Royal Canadian Air Force statistics it was shown that present strength of the R.C.A.F. is now more than 200,000, including nearly 13,000 in the Women's Division, as compared to a total pre-war strength of 4,000.

Aircrews of the R.C.A.F. serving with the R.A.F. squadrons form 25 per cent. of the R.A.F.'s flying strength. This does not include R.C.A.F. squadrons operating in the United Kingdom and elsewhere. There are 32 specifically R.C.A.F. squadrons already organised, and six squadrons in the process of organisation. For every R.C.A.F. aircrew member in an R.C.A.F. unit overseas there are now 11 R.C.A.F. aircrew members in R.A.F. units overseas.

The proportion of R.C.A.F. to R.A.F. will increase rapidly, according to Air Marshal Harold Edwards, air officer commanding the R.C.A.F. overseas. Projected average strength of the R.C.A.F. home war establishment during the fiscal year ending March 31st, 1944, is approximately 35,000.

CANADIAN PRODUCTION—

CANADA is now in production with several military types, including the Lancaster, Mosquito and Curtiss Helldiver, and production figures will increase steadily, a report of the Department of Munitions and Supply, Ottawa, states. Nine types of aircraft are now being produced in Canada, and later this year the Dominion's aircraft industry expects to be producing a transoceanic cargo aircraft. The design of a Canadian four-engined transport aircraft has been started. The Canadian aircraft industry and plants in component manufacture now employ more than 100,000 workers.

—AND RESEARCH

IN a report on aeronautical research by the Government's National Research Council since the start of the war, projects reported on include airscrew and windshield de-icing, and wing de-icing employing heat from the engine exhaust. Much work was done with the use of moulded plywood in place of duralumin and steel, to use the wood potential of Canada to the fullest, and production in Canada of Anson twin-engined trainers largely of wood and the wooden Mosquito has resulted.

Aircraft Weight Reduction

Two Views Emphasising the Desirability of High Power/Weight Ratio

This is the first of a series of articles based on abstracts from the world's scientific and technical press as compiled by the R.T.P.3 section of the M.A.P.

The subjects dealt with in this series will fall into one of the seven following groups :

A Aerodynamics and Hydronamics.
B Aircraft and Airscrews.
C Engines and Accessories.
D Materials and Methods.
E Instruments and Devices.
F Production.
G Physiology and War Medicine.

Each article appearing will carry its classification group letter followed by a number to indicate that it is the 2nd, 7th, 4th, etc., in that group to be published, and a reference of issue dates of previous numbers of "Flight" in which appeared articles of the same subject group. For example, the article appearing in this issue is B.1, indicating that it is the first article published dealing with the B subject group, but no issue dates are included as this is the first article in the series.

The articles will not appear in the alphabetical order of their groups.

THE exercise of weight control in the design and construction of the complete aircraft is, according to Mr. M. Boe, writing in *Aero Digest*, not as yet a basic policy in the American aircraft industry.

This important—even vital—aspect of aircraft engineering is apparently practised to an effective degree by our American Allies only on that part of the aircraft which is designed and built by the manufacturer. This means that only about 40 per cent. of the gross weight (i.e., the airframe proper) can be considered to be really efficient from the aspect of weight reduction, this being achieved at considerable trouble and expense by the weight control group. The remainder of the gross weight is made up of approximately 20 per cent. disposable load and 40 per cent. equipment.

With rare exceptions, the author points out, weight consciousness has not as yet percolated through (the phrase is his) to those responsible for equipment design, and considerable improvement, he contends, should be possible in this field, which in total weight approximates to that of the aircraft structure itself.

It is interesting to note in this connection that examination of the equipment installed in the Me 110 has established that German instruments and small accessories are approximately 10 to 15 per cent. lighter; armament equipment up to 50 per cent. lighter, and the engines 9.5 per cent. lighter (on the basis of lb./take-off h.p.) than the equivalent standard American equipment.

Equipment/Structure Ratio

A saving in equipment weight alone is doubly beneficial when it is realised that every pound of equipment requires on the average half-a-pound of supporting structure. By judicious application of forethought in the design of equipment, a weight reduction of 8 per cent. would appear a reasonable proportion and even though the original aircraft structure is retained, a reduction of this order would enable a fighter with a gross weight of 7,250 lb. to carry an additional 230 lb. of load.

Mr. Boe suggests that this saving could be utilised in providing any one of the following:—

(1) An increase in range of 25 per cent.
(2) An increase in fire power by 750 rounds.
(3) The addition of 17 sq. ft. of armour protection.

Alternatively, a more powerful engine could be fitted and thus increase the performance at the expense of range.

It is generally recognised that with aircraft of orthodox design a 10 per cent. increase in the power output entails an increase in the gross weight of the aircraft of about 3.5 per cent., with the result that the actual increase in performance obtained is relatively slight.

The author illustrates this point by a comparative table, as under:—

	Original	+10% power (same weight)	+3.5% weight	New Performance
SPEED (m.p.h.)	350	+12	−2	360
RATE OF CLIMB (ft./min.) ...	2,480	+500	−310	2,670
CEILING (feet)	31,600	+5,060	−3,210	33,450
RANGE (miles)	1,000	—	−15	985
LANDING SPEED (m.p.h.) ...	80	—	+1·5	81·5
TAKE-OFF DISTANCE (feet) over a 50-ft. obstacle	1,800	−200	+140	1,740

It should be noted that the increase in weight is especially detrimental in eliminating a large proportion of the increase in both rate of climb and ceiling that would nominally be expected from an increase in power output.

From this point the author expresses the ubiquitous yearning for having the cake and eating it. He has accepted an increase in power output of 10 per cent., and for this has paid the price of 3.5 per cent. increase in gross weight. He then continues, if the gross weight of the aircraft could be decreased by only 3.5 per cent. by careful design of equipment and airframe, the rate of climb could be increased by another 300 ft./min., and the ceiling raised by over 3,000ft.

Mr. Boe concludes with the observation that whilst it has been customary up till now to increase performance by fitting bigger and heavier (and presumably more powerful—Ed.) engines, the alternative of weight reduction seems to have been lost sight of. He then inserts a plaintive parthian shot—the Mitsubishi 00 fighter is an interesting example of what can be done with relatively small power plants if the weight of the aircraft is sufficiently reduced. This machine, it will be recalled, has an engine of 1,200 h.p. and total weight of 5,200 lb.

On the same theme, the designer of the Focke Wulf 190, Kurt Tank, writing in *Luftwissen* in April, 1943, a translation of which appeared in the August 8th, 1943, issue of *Flight*, briefly enumerates desirable qualities for high performance fighters. He quotes (a) maximum possible horizontal speed at all altitudes, (b) very high ceiling and rate of climb, (c) highest possible diving speed, and (d) excellent manœuvrability. All these desirable features to be combined in the smallest and lightest possible aircraft capable of housing the pilot and power plant, together with such essential equipment as fuel and armament.

Design Compromise

The incompatibility of various of these desiderata make it impossible to achieve optimum value for all these qualities in one and the same design. For example, high horizontal speed and high rate of climb necessarily imply differences in wing loading if optimum values are to be obtained with a given power output. Further, at very high altitudes an increase in aspect ratio is beneficial, whilst manœuvrability generally goes with a small wing span.

Now that combats are taking place at ever-increasing altitudes, the aircraft with the higher ceiling and the ability to reach it quickly has a very important advantage.

Tank has investigated this problem very fully and concludes that with careful design, optimum rate of climb and ceiling can be achieved for a relatively small sacrifice in maximum horizontal speed; he calculates this as amounting to about 1½ m.p.h. and 34 m.p.h. at supercharged heights of 20,000ft. and 40,000ft. respectively. On the other hand, the more lightly loaded aircraft has the advantage of

AIRCRAFT WEIGHT REDUCTION

5,570ft. in ceiling and 12 ft./sec. in rate of climb. In point of fact the reduction in horizontal speed is likely to be less than 34 m.p.h. since the calculation neglects compressibility effects (which would be more pronounced for the heavily loaded aircraft flying at the greater incidence).

It is thus clear that for operation between 20,000 and 40,000ft. the fighter should be designed primarily for maximum rate of climb and the wing loading should not be more than about 30 lb./sq. ft.

Adequate strength of the structure is of primary importance since compressibility effects may produce sudden changes in load distribution, especially during a high-speed dive. This may not only reduce the effectiveness of the control surfaces, but may actually lead to destruction of the wing. Several fatal accidents have actually been attributed to this effect.

Herr Tank also makes a plea for restricting the weight of equipment to the bare minimum. At 30,000ft. an increase of one per cent. in the gross weight of the aircraft will reduce the ceiling by about 215ft. whilst an increase of one per cent. in the h.p. will only increase the ceiling by 140 feet.

Unfortunately, high-altitude operation necessitates extra equipment, such as oxygen for the pilot and heating for the guns, and the power unit also becomes heavier due to the increased size of supercharger and airscrew.

These conclusions form the basis of a problem which to-day confronts designers of high-performance fighters. Some suggest that the answer lies in having two sub-types of a fundamental design, each designed specifically for a given operational condition. This appears to be an eminently sound line of reasoning, and difficulties in producing the two types should not prove much greater than tooling-up for one type.

The performance characteristics of the Spitfire IX and the VB (clipped wing) show that even modification of an existing design can produce two sub-types of aircraft, each of which is well-nigh paramount in its specialised sphere.

WOOD IN AIRCRAFT CONSTRUCTION

THE Ministry of Aircraft Production has recently set up an "Advisory Panel on the Application of Wood in Aircraft Construction," with the following terms of reference:

To advise the M.A.P. on all matters relating to the use of wood in aircraft, with the following objectives:

(1) Improving the quality of wooden aircraft and components.
(2) Aiding production by technical improvement of processes.
(3) Making the most effective use of the available timber.
(4) Improving the quality of glues.

With a view to the above, the Panel will: (i) Examine problems of wood construction technique which confront the aircraft industry. (ii) Consider research and development now continuing both in official laboratories and at firms' works and advise about priority and the need for sponsoring further research and development. (iii) Arrange for making technical information available to members and firms represented.

At the invitation of the Ministry of Aircraft Production, Dr. W. Blakey (Beetle Products Co., Ltd.) was appointed by the Synthetic Resin Manufacturers' Section as the Federation's representative on this advisory panel, and Dr. A. Caress (I.C.I. (Plastics) Ltd.) has also been appointed to the Panel as representative of the Aircraft Plastics Main Technical Committee.

EVE MAKES FAST: A demilitarised Sunderland flying boat belonging to British Overseas Airways Corporation. A blank fairing takes the place of the retractable nose turret. The women seamen bringing the launch alongside take a three months course in morse and semaphore signalling, compass work and general seamanship.

Behind the Lines

Service and Industrial News from the Inside of Axis and Enemy-occupied Countries

Croatia's Air Force

FROM Zagreb it is announced that the head of the puppet government of Croatia has accepted the resignation of the C.-in-C. of the Croatia Air Force, Vladimir Kren.

Col. Adalbert Tozulja has been appointed his successor.

Jap Effort

THE newly set-up Japanese Ministry of Munitions, which starts working on November 1st, will give special attention to increase in aircraft production, reports Tokyo radio. Such an increase, in Japanese opinion, is not only urgently needed, but also possible.

The necessary labour for the expansion of the industry is expected to be provided by a further mobilisation of Japan's man-power.

Luftwaffe Salvage

LUFTWAFFE units are reported to have been extensively used in the evacuation of the Taman Peninsula, on the Southern Russian front. Ju 52s, using hastily prepared landing grounds, are said to have carried out these salvage operations every day, as, for instance, on October 12th, when a battalion of German grenadiers was transported to the rear.

Because of the necessity to speed up the retreat, and the apparent short supply of crews, these transport units have been largely overworked, the German report saying that "pilots have been getting up at 3 a.m. and flying until nightfall for weeks."

Revelation

A COMPLETELY equipped Alfa-Romeo aircraft engine factory has been discovered by Allied troops concealed in four huge grottos in Naples, from which Neapolitans used to hew stones to build their houses. In these natural bombproof shelters a foundry, workshops, drawing offices and an administrative section had been established. Under the glare of huge electric lamps aircraft engines, including 12-cylinder Daimler-Benz, were being turned out in considerable numbers.

Evidence of last-minute attempts by the Germans to destroy the factory before the arrival of our troops was found in one of the workshops, where 12 radial engines were lying on the ground burned to a heap of twisted metal. The factory also turned out complicated signal lamps and other night-flying equipment.

German Night-fighter Killed

CAPTAIN AUGUST GEIGER, a *Luftwaffe* ace night-fighter pilot and holder of the Knights Insignia to the Iron Cross, has been killed in what was described by the German radio as "grim combat." Captain Geiger was credited with having shot down five bombers in a heavy raid on Berlin last March.

PREMIÈRE: First picture of the Ju 87D2 employed on the Russian front in which the twin 7.9 mm. M.G.s in the rear cockpit have been replaced by a 13 mm. M.G. 131 Rheinmetall-Borsig.

Tactics

COMMENTING upon Allied raids, a German commentator complains that "the enemy's tactics change frequently. At one time they make a concentrated single attack, next time they try to split up our air defences. They must be intercepted by day and night fighters and overcome by better tactics. This constantly presents our Command with a very hard task and requires great flexibility and inventiveness on the part of our men."

Call Up

THE Germans and Mussolini are attempting to rally the remnants of the *Regia Aeronautica*. Lt. Col. Tito Falconi, who has been charged with the task of reassembling some air units, made an appeal to members of the *Regia* to continue to fight on Germany's side.

"In appointing me Commander of Italian Fighter Aircraft," he said, "the German armed forces give you this possibility."

It is doubtful how many Italians will avail themselves of this offer, and it appears that many officers and men of *Regia's* fighter units left their stations after Italy's collapse and went home.

In his appeal, Falconi addresses himself especially to officers and men of the following units, whom he asks to return to their respective stations: The 1st *Stormo* to Udine; the 2nd and 53rd *Stormo* to Turin; the 3rd and 151st groups to Turin and members of the Air Force garrison of that city; the 3rd and 4th *Stormo* to Gorizia; the 50th *Stormo* to Treviso; and the 51st *Stormo* to Milan.

All military and civilian personnel of the above stations are asked to go to their last stations. All personnel of other fighter formations are urged to proceed to the nearest of the places indicated above, where—says Falconi—"you will find one of my officers, together with German comrades."

Another order broadcast in the German-controlled Italian home service and issued by the new Under-Secretary for Air, Lt. Col. Gotto, "in agreement with German military authorities," informs all military staff (apparently other than fighter units) on leave to remain in their places of residence and to await further instructions.

More on the Me 410

AS reported on this page in the issue of *Flight* dated October 7th, the *Luftwaffe* is employing a development of the Me 210 designated the Me 410. While the Me 210 is powered with a 1,395 h.p. Daimler-Benz 12-cylinder D.B.601, the Me 410 is equipped with a Daimler-Benz 16-cylinder of 1,800 h.p. at 19,000ft.

Carrying a smaller bomb load than the Me 210, the new version has heavier armour. Its armament comprises two 20 mm. shell-guns and two fixed M.G.17 7.9 mm. m.g.s firing forward, while the lateral blisters on the fuselage accommodate two 13 mm. remotely controlled machine guns.

The Me 410 is employed either as a fighter or as a bomber; the fighter version is reported to have a maximum speed of 390 m.p.h. at 22,000ft. with a range of just over 1,000 miles.

New Stukas

THE picture on this page shows the Ju 87D2, a modified version of the well-known Stuka, employed on the Russian front. The only difference between the new type and its predecessor, the Ju 87D, is the armament; the twin 7.9 mm. machine guns in the rear cockpit of the Ju 87D having been replaced by a 13 mm. Rheinmetall-Borsig M.G.131, which has a rate of fire of 900 r.p.m.

The Ju 87D2 is still powered with a Jumo 2117F-1 of 1,075 h.p., and its armour comprises an 8 mm. plate back of the pilot's seat and 4 mm. side plates, a 10 mm. head shield and floor and rear gunner protection.

Another version of the Ju 87D, said to be in operational employment by the *Luftwaffe*, is equipped with two 37 mm. *Flak* 18 guns modified for mounting in the wings and firing armour-piercing projectiles. The rate of fire of this type of gun will not be high, and should be in the region of 120 rounds per minute.

Seventy-first of the Latest Recognition Series

Aircraft Types and

BEECHCRAFT AT-11 (KANSAS)

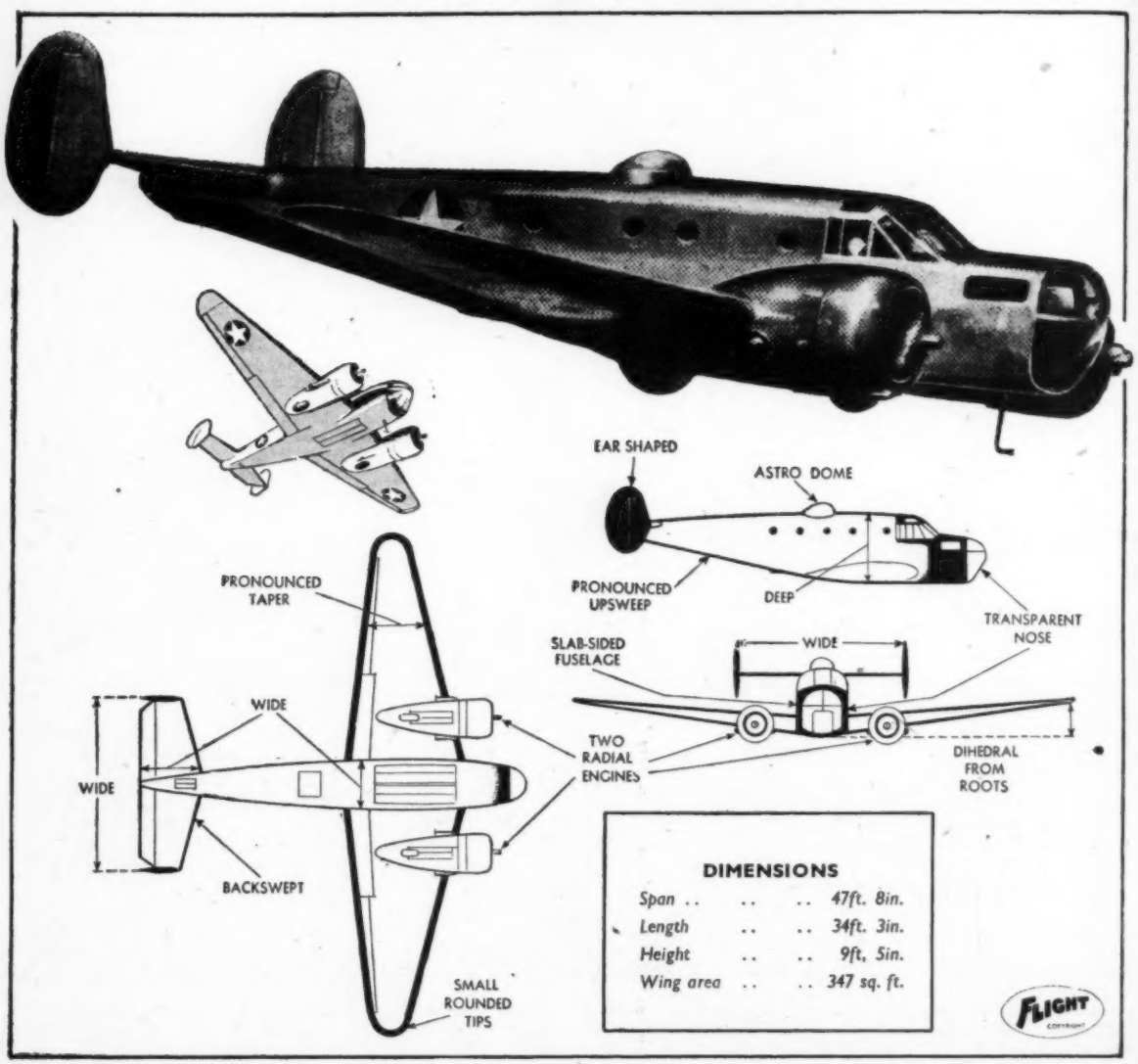
IN service in considerable numbers with the U.S. Army as the AT-11, and with the U.S. Navy as the SNB-1, the Beechcraft "Kansas" is a bomber trainer which is also adaptable for instruction in flexible aerial gunnery.

In general design it is similar to the Beechcraft "Voyager" which is a service transport version of the civil Model 18S and known as the C-45A in the U.S.A.A.F. and as the JRB-1 and JRB-2 in the U.S. Navy.

The Kansas, which differs from the Voyager in having a modified fuselage with transparent nose, is provided with bomb racks and movable machine guns and also has a dorsal dome for astral observation. Power is provided by a pair of 450 h.p. air-cooled, radial Pratt and Whitney "Wasp Junior" engines, and top speed is in the region of 210 m.p.h. A crew of three or four (the exact number depends upon the nature of the instruction being given) is carried, and it is claimed that like all Beechcraft trainers, the Kansas combines near-tactical high cruising speed with low landing speed and easy manœuvrability.

Of all-metal stressed skin construction, the tapered wings are of the single spar type, and the roomy, slab-sided fuselage comprises built-up bulkheads with extruded section stringers, the smooth metal skin being riveted to both. All control surfaces, including flaps, are fabric covered, and the undercarriage and flaps are electrically operated. The former retracts backwards into the engine nacelles and has air-oil shock absorbers and hydraulic wheel brakes.

Recognition features include the pronounced taper of the wings, mostly on the leading-edge, to small rounded tips; large, wide-span tailplane with backswept leading-edge, and "ear-shaped" twin endplate fins and rudders, set high in relation to the thrust-line. The fuselage is deep at the centre section but tapers sharply upwards to the tail on its underside.



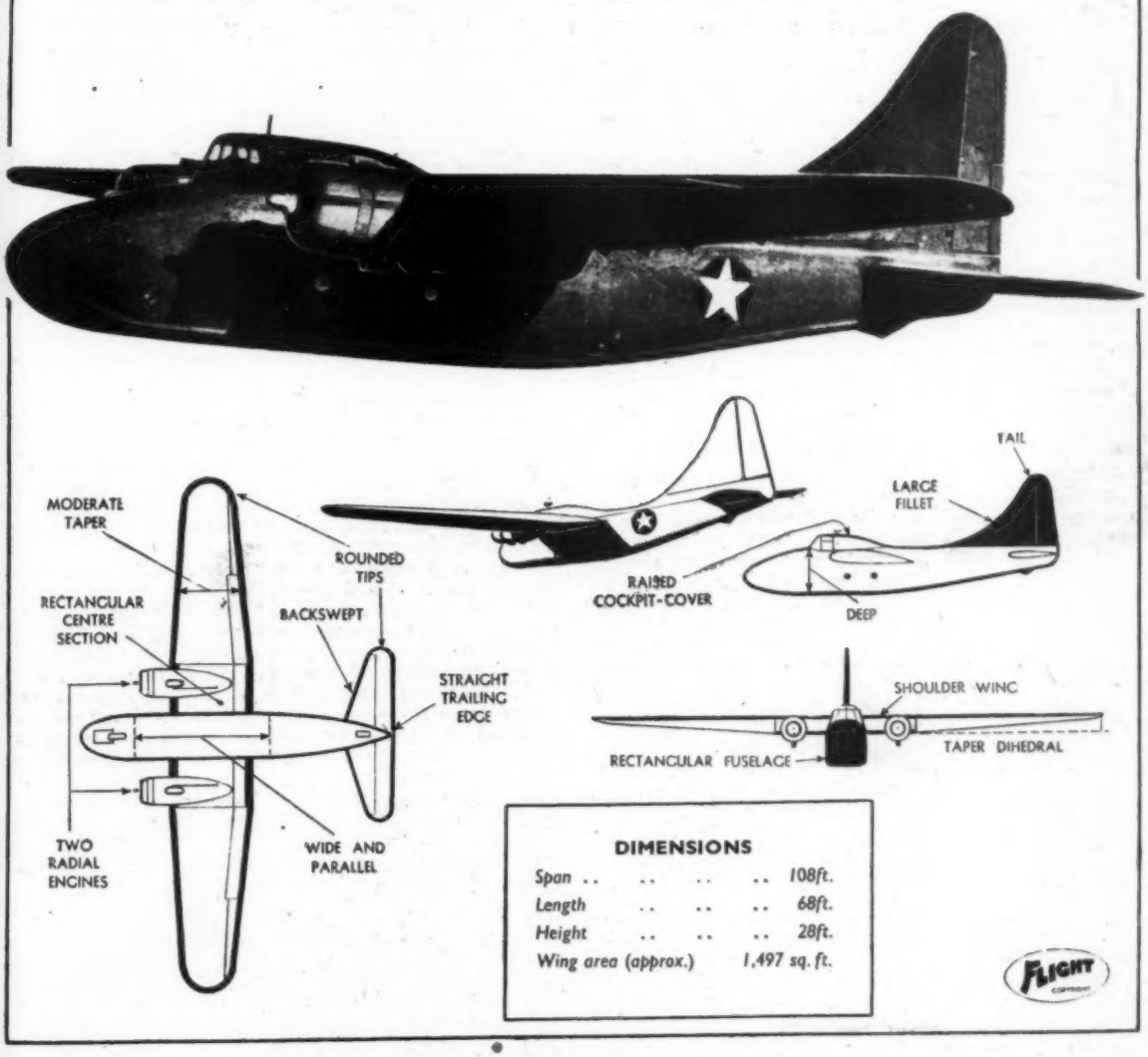
DIMENSIONS

Span	*47ft. 8in.*
Length	*34ft. 3in.*
Height	*9ft, 5in.*
Wing area	*347 sq. ft.*

FLIGHT COPYRIGHT

Their Characteristics

CURTISS CARAVAN (C-76)



DIMENSIONS

Span	*108ft.*
Length	*68ft.*
Height	*28ft.*
Wing area (approx.)	*1,497 sq. ft.*

OF approximately the same size as the Commando, the Curtiss Caravan is the first Curtiss type to be designed specifically as a military transport, and has the symbol, C-76, in the U.S.A.A.F.

In setting out with this function exclusively in view, certain factors had to be considered which do not apply in an aircraft intended primarily for bombing, and which cannot be allowed too high a priority in a general purpose design which may be employed variously as a bomber, bomber-transport or bomber-reconnaissance type. In short, there was no need to place sheer performance in terms of speed and/or altitude first, nor was it even necessary to compromise in design with a diversity of more or less conflicting duties in mind.

Possibly the three chief requisites in the efficient military transport aircraft are as follows:—Maximum pay-load for available horse-power, maximum stowage space for bulky items of freight, and maximum convenience in loading, unloading, and handling cargo inside the fuselage. A reasonable performance when fully laden can be assumed in any modern aircraft, but cost of operation, though important in a commercial air freighter, is hardly considered in a military type.

The first consideration fell in conveniently with the desirability of using "non-strategic" materials and, therefore, the Caravan airframe is built entirely of wood, the fuselage being a semi-monocoque structure with stressed (wood) skin. The second virtue is met by making the fuselage of rectangular cross-section, and the third by making the Caravan a high-wing type with tricycle undercarriage which permits a low and level floor for loading and unloading.

Two 1,200 h.p. Pratt and Whitney 14-cylinder "Twin Wasp" engines provide the power, but no performance figures are yet released.

An Unorthodox Swedish Project

Asymmetrical Fighter and Bomber : Prone Position for Pilot : Two Napier Sabre Engines

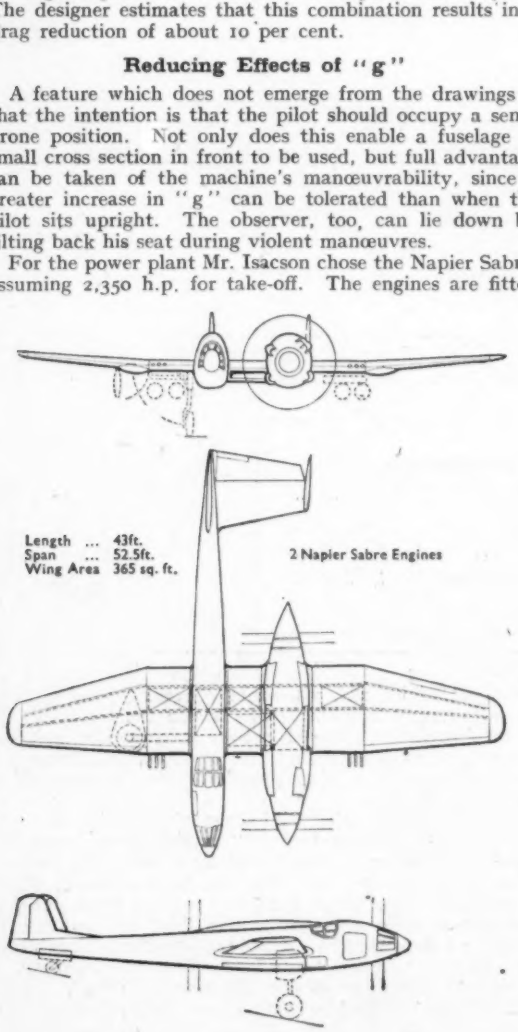
THE asymmetrical aircraft shown in the accompanying general arrangement drawings represents a project by a Swedish aircraft engineer, Mr. Sigurd Isacson. It was, in point of fact, a part of his passing-out examination, and was awarded "full marks." We are indebted to our Stockholm contemporary *Flyg* for the layout from which our g.a. drawing was prepared, and also for the description and data which follow.

Basis for the design was the provision of a heavy fighter which could also be used as a multi-purpose bomber and as an escort fighter. High speed was the fundamental idea, and in order to obtain this without sacrifice of armour and armament a somewhat unusual design was chosen, which included a high-speed wing section and two powerful engines placed in tandem on an asymmetrical layout. The designer estimates that this combination results in a drag reduction of about 10 per cent.

Reducing Effects of "g"

A feature which does not emerge from the drawings is that the intention is that the pilot should occupy a semi-prone position. Not only does this enable a fuselage of small cross section in front to be used, but full advantage can be taken of the machine's manœuvrability, since a greater increase in "g" can be tolerated than when the pilot sits upright. The observer, too, can lie down by tilting back his seat during violent manœuvres.

For the power plant Mr. Isacson chose the Napier Sabre, assuming 2,350 h.p. for take-off. The engines are fitted with flame-damped and efflux-reaction exhausts. In order to avoid tip speeds above the speed of sound, contra-rotating airscrews are fitted.



ISACSON DESIGN
2 Napier Sabre Engines

Dimensions	
Length o.a.	*13.1 m.* (43ft.)
Wing span	*16.0 m.* (52.5ft.)
Wing area	*33.9 sq. m.* (365 sq. ft.)
Weights	
Gross weight (fighter)	*9,000 kg.* (19,800 lb.)
Wing loading	*266 kg./sq. m.* (54 lb./sq. ft.)
Bomb load (long range)	4 *250-*, *100-* or *50-kg.* bombs under wings up to *1,000 kg.* (2,200 lb.)
Maximum bomb load	4 as above, plus 5 *100-* or *50-kg.* bombs in fuselage and nacelle up to *1,500 kg.* (3,300 lb.)
Performance	
Max. speed (at *6,500 m.* for 5 mins.)	*770 km./h.* (478 m.p.h.)
Max. cruising speed at *7,800 m.*	*700 km./h.* (435 m.p.h.)
Ceiling	*10,700 m.* (35,000ft.)
Maximum rate of climb (at *6,500 m.*)	*1,170 m./min.* (3,840ft./min.)
Climb to *6,500 m.* in 6.1 mins.	
Max. range (fighter)	*1,800 km.* (1,120 miles)
Max. range with wing bombs	*1,500 km.* (930 miles)
Max. range with full bomb load	*470 km.* (290 miles)
Duration (fighter)	2.7 hours.
Landing speed	*155 km./h.* (96 m.p.h.)

Provision is made for a total fuel supply of 1,730 litres (380 gallons). These petrol tanks are located in the wings, of a total capacity of 570 litres (125 gallons), and an oil tank contains 150 litres (33 gallons). In the fuselage and engine nacelle are a further two petrol tanks, each of 580 litres (128 gallons). When the machine is to be used with full bomb load, these two tanks are removed and replaced by bomb racks and bombs. The tanks are provided with self-sealing rubber coverings, and provision is made for blowing cooled exhaust gas through them above the petrol level so as to reduce fire risk.

One of the drawbacks of the asymmetrical aircraft, the designer points out, is the difficulty of getting symmetrical loads. In this project the wing is itself symmetrical, and fuel, bomb and ammunition loads are evenly placed on each side of the centre of lift.

HELICOPTER RESEARCH

THE Cierva Autogiro Co., Ltd., is resuming its activities in the field of helicopter research. For the present these activities will be confined to the completion of the development of the helicopter following successful experiments conducted between 1937 and 1940 under the guidance of Mr. C. G. Pullin, the first practical British helicopter, built by Messrs. G. and J. Weir, Ltd., in collaboration with the Cierva Autogiro Co., Ltd., being demonstrated on June 7th, 1938, at Dalrymple, Ayrshire, using only a 50 h.p. engine.

This technical programme will be under the direction of Mr. C. G. Pullin, whom the board have now invited to join them as managing director, with every confidence that this is a most suitable appointment for the phase upon which the company is entering.

Mr. R. Blake is returning as secretary and commercial manager and the company hope, despite present difficulties, to gather together a small but efficient technical staff to carry out their future plans for research and development of helicopter possibilities both during the war and afterwards.

For this purpose premises have been obtained with an engineering firm who have kindly placed a part of their works in England at the disposal of the company, where a certain amount of experimental work will be carried out, though the company will adhere to its original policy of subcontracting a greater part of its manufacture.

A Russian View

Versatility of Old Types : Preference for Air-cooled Engines : Improvements in Armour and Fire Power

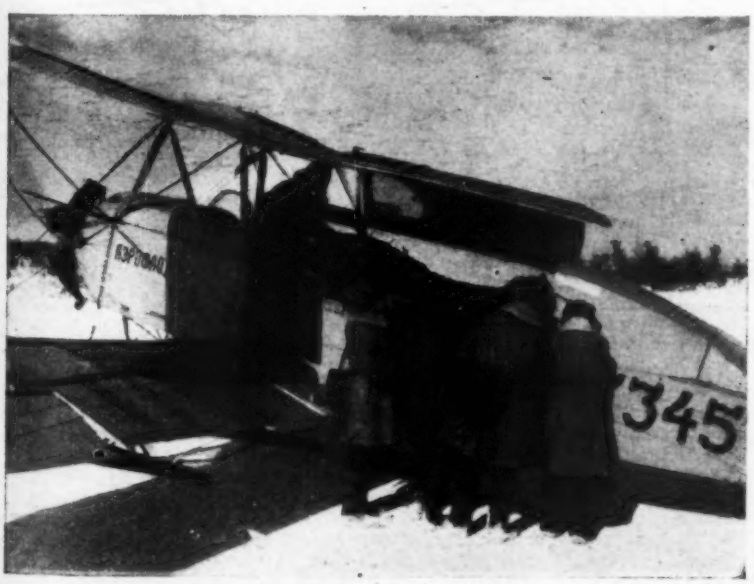
By NIKOLAI POLIKARPOV

Nikolai Polikarpov is one of Russia's leading aircraft designers and the head of one of the oldest designing teams in the Soviet Union. Decorated with the Order of "Hero of the Soviet Union," he received early this year for his achievements in aircraft construction the much-coveted Stalin prize. Below we give an extract from a recent talk on the Moscow radio, in which the designer gave a brief outline of his work and that of his colleagues, and of the development trend of Russian aircraft.

THE Germans once credited us with having an aircraft that could fly up to a window and look over the sill to see whether there were any Germans inside. That was the U-2, emerged from its peaceful retirement. Because it could land on small patches of ground it proved extremely useful for picking up wounded almost on the battlefield. It worked as a transport during the Caucasus battles. It proved useful as a night bomber at Stalingrad, and later began to go out on day missions.

Our team of designers is one of the oldest such teams in the Soviet Union. The U-2 aircraft, for example, was built more than 15 years ago, and normally would be considered by now as obsolete. Owing to its fundamental qualities, however—safety of flight and capacity—it still lives and works well in supplying the Red Army. It is not only suitable for training, but has also proved excellent for first-aid work, communications and supplies, and is also fulfilling useful military work such as short-range bombing, short-range reconnaissance, communications with guerillas, etc. Owing to its excellent flying and landing qualities, simplicity of operation, and the fact that it can "forgive" even serious mistakes on the part of its pilot, the U-2 has become a great favourite with young Air Force recruits. Guards bomber regiments have many U-2 aircraft and Soviet airmen perform downright miracles in this aircraft.

Another old aircraft, the I-16 fighter, is still operating successfully against the *Luftwaffe*.



STILL GOING STRONG : The U-2 biplane which made its first appearance some fifteen years ago is still successfully employed for training and ambulance work.

My team of designers produces fighter aircraft, light and heavy aircraft, bombers, gliders and powered gliders, continued Polikarpov. This team has already created a number of new models which have successfully passed their tests and received high praise for their flying and fighting qualities. Our work has been highly appreciated and received a Stalin first prize in 1943. We know that if we do not progress we go backwards. We must improve the quality of aviation technique day by day, hour by hour. In our sphere, the slightest mistake in perfecting the flying and fighting qualities of a given aircraft means great loss and sacrifices.

New Types, Not Modifications

The great and important task of improving military aircraft cannot be accomplished merely by modification of existing types. This is only one way, albeit a very useful one, involving small risk—but also comparatively small improvement in flying qualities. The main thing is to create new types of aircraft because only in this way radical improvement can be achieved.

The times have passed when a fighter aircraft with a speed of 370 m.p.h. and a small-calibre gun could satisfy the needs of the front. Modern demands for speed are incomparably higher, and the present possibilities are far higher than aircraft designers dared to dream of even quite recently. We always believed it possible to equip aircraft with guns of much higher calibre. Now it is impossible to imagine a ground support aircraft armed with a small-calibre gun, or a fighter without a large-calibre synchronised gun.

Another idea of our designers has been accepted during the war: to give preference to air-cooled engines. In our view, these engines have a very important, invaluable fighting quality: they are more durable and less vulnerable to fire. Therefore we use them extensively for our aircraft.

Our teams pay great attention to protection of the crew—by armour and the construction of types which are not so vulnerable. Inexpensive, easily available material is required, which will stand up to firing. The war has clearly shown the importance and necessity of using cheap, readily procurable material in aircraft production, such as timber, plywoods, various kinds of steel, linen, and so on. Our work connected with the technological processes involved in producing our aircraft is, of course, difficult, but it is fully repaid in the increased output of aircraft, particularly when the work is done on the "even flow" methods.

This war has also demonstrated to us the urgent need not only for the introduction of simpler structural materials, but also for the simplification of the actual production process of aircraft.

Finally, the need has been felt of late for an aircraft capable of performing military operations at a high altitude, say, at 38,000 to 39,000ft.

In this brief review—concluded the designer—I have not been able to deal with the variety of requirements which confront present-day aircraft construction, but we take note of all of them in our work.

B-29 Delivered to U.S.A.A.F.

New Heavy Bomber with "Record" Bomb-load : Range and Speed Claimed Greater Than Current British Types

ALTHOUGH no official data have yet been released for publication on the new American bomber, known to the U.S.A.A.F. as the B-29, it has been stated that its bomb load is "considerably greater" than that of any existing bomber, together with greater range and cruising speed.

But from this scanty information it is possible to make one or two assumptions and from such assumptions, deduce certain probabilities.

In the first place, any substantial simultaneous increase in bomb-load, range and speed must of necessity indicate the accumulation of a great deal of knowledge gleaned from experience on actual operations by a design team already familiar with the peculiarities of the largest current types of bomber. This suggests that the B-29 is probably a development of the Flying Fortress, in which case it is likely that its external appearance will bear some family resemblance to its forerunner. It may be significant, too, that efforts to increase the bomb-load of the familiar Fortress II by the addition of external wing-racks, show a realisation by Boeings that the bombing policy of the Allies in the European theatre calls for considerable improvement in this direction.

The maximum bomb-load carried by "any existing type" is that of the Lancaster at just over eight tons, so a "considerable" increase on this figure might mean anything from ten to, say, fifteen tons maximum load.

Discounting the unlikely factor of a revolutionary discovery in metallurgy, and the even less likely idea of some entirely unconventional (and therefore dangerously experimental) design features, a bomb-load of 12 tons or more suggests a gross weight of at least 100,000 lb. To arrive at a reasonable estimate of the wing area and span of an aircraft of this weight, it is necessary to consider the probable wing-loading, and since the tendency is known to be in the direction of still heavier wing-loadings, this may well be over 60 lb./sq. ft. This in turn would suggest a span exceeding 130ft., and a wing area of some 1,500 sq. ft. at least.

The question of engines is an easier one if one adheres to the assumption of nothing dangerously experimental. America's most powerful aircraft engines to date are the 2,000 h.p. 18-cylinder. Pratt and Whitney and Wright Cyclone units, so they are almost certainly one of these two types.

When one comes to armament, the success of the Fortress in shooting down gratifying numbers of enemy fighters suggests that the 0.5in. machine gun will again be the principal weapon employed, and that power-operated turrets in nose and tail, above and below, not forgetting the latest "chin turret," will house the guns, mostly likely in pairs. The possibility that cannon may be included cannot be ignored.

As for the increases in speed and range, these factors are closely related to fuel capacity and consumption, so an appreciable increase in tankage allied to a very clean aerodynamic shape are clearly indicated.

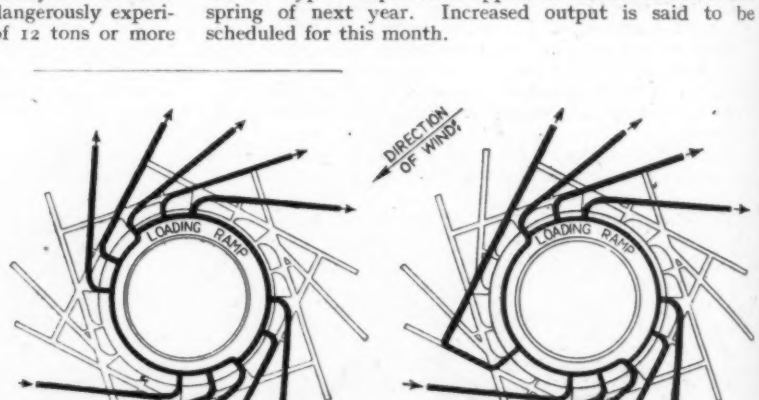
Latest reports state that the first production B-29 bombers have already been delivered to the U.S.A.A.F., and that the new type is expected to appear in actual combat in the spring of next year. Increased output is said to be scheduled for this month.

Tangent Runways

Suggested Pattern for New Idlewild Airport

WITH the object of considerably increasing the safe maximum density of the new Idlewild airport now under construction for New York City on a site on Jamaica Bay, it has been suggested that the parallel runway system planned for it should be abandoned in favour of a tangent runway pattern.

The proposal to adopt this radical departure from the traditional U.S. airport layout comes from American Airlines, whose planning committee has prepared a comprehensive study of the scheme as applied to Idlewild. This shows that the tangent pattern, with runways spoking out from airport buildings at the hub, would be able to cope with New York's air traffic requirements for at least ten years after the war, whereas the parallel runway system would be inadequate after two or three years, thus necessitating the construction of costly additional airports elsewhere.



Domestic airlines using 6,000ft. runways (left), and long-range aircraft and domestic using 10,400ft. and 6,000ft. respectively on right.

The committee points out that, while the parallel system permits the simultaneous landing and take-off of only two aircraft, the tangent pattern they recommend extends it to five, and at the same time increases the safety factor by providing increased lateral separation while flights are in the final approach or initial climb area.

Saying that landings and take-offs directly into the wind are not necessary with tricycle landing gear under average wind conditions, the committee claims that a fully developed tangent runway airfield could cope with a maximum of 374 movements per hour as compared with the 80 per hour of a parallel runway system restricted by its runway intersections.

The project calls for both 6,000ft. and 10,000ft. runways, and the company has provided a chart showing how its tangent plan can be developed in four stages according to the increasing traffic need.

Pigeons as Birds of War

Their Uses Include Carrying of Messages and Pictures, and Even the Taking of Photographs : They Now Make Return Trips and Fly at Night

By FRANK W. LANE

PIGEONS have done invaluable work in the war. Not only have they returned with messages from crews of dinghies whose radio failed, but they have brought home messages reporting "All Safe" from crews forced down in Germany. The first pigeon to do this was owned by H.M. The King. The speed of pigeons is remarkable. 400 miles in ten hours has been achieved more than once. One bird covered 130 miles in the dark between 1.50 a.m. and 7.20 a.m.

IT has been estimated that during the first World War over half a million pigeons were used by the combined Allied forces. Add to that the number of birds used by the enemy and you have a total of about a million. This figure gives some idea of the immense importance attaching to pigeons in time of war.

But it is only one particular breed of pigeon which is used in war—the racing- or homing-pigeon, *not*, be it noted, the carrier-pigeon.

Several factors are responsible for making the pigeon an efficient message-carrier. In the first place, it is a wonderful natural flying-machine. Its compact, streamlined body is an ideal base for the attachment of the strong wings and highly flexible tail and for housing the powerful "engine" which supplies the energy for flight.

Some idea of the power of the pigeon's driving mechanism can be gathered from the fact that the greater pectoral muscles, i.e., those used primarily to actuate the wings, weigh about one-quarter of the bird's entire body. In flight a pigeon develops nearly 0.02 horse-power, which represents 0.057 h.p. per kilogram of weight. This is some six times greater than that which a man can develop over a period of any length.

A first-class racing-pigeon, going all-out, is one of the speediest things in Nature. With maybe a little help from a following wind, a pigeon can touch 100 m.p.h. for a short distance. I understand that the highest speed ever maintained by a pigeon over a long distance was 93 m.p.h. for 80 miles. I think it is a fair inference that for such an exceptional record we must assume the bird was getting considerable help from the wind—or gale! But, even so. . . .

Add to such superb natural flying equipment the facts that it seems to possess an almost psychic knowledge of weather lore and aerial navigation; that its feathery "flying coat" insulates its body so perfectly that it can fly through the foulest weather with probably little discomfort; that it has the faculty of finding its way to the home loft from distances of hundreds and sometimes thousands of miles, and it will be realised why the homer proves such an invaluable message-carrier to nations at war.

At the outbreak of the present war every known loft in this country was visited and the pigeons were forced to fly. If the birds had come from another loft they naturally flew home—and some of the birds didn't stop flying until they reached Germany! But they carried none of the valuable messages which they probably would have done a little later.

I understand that since the "fifth-column" pigeons were sent packing, the Germans have tried to drop further supplies of native birds by parachute at night. Apparently more than one Nazi spy, on being captured after parachuting down, has been found to have a wicker basket containing a homer or two.

Teaching Immediate Delivery

Pigeons do not become effective Service message-carriers without some training. One important duty they have to be taught is to deliver the message they are carrying immediately they arrive at the base loft. Young, untrained pigeons sometimes have a tendency to hang about on reaching home, and a good deal of coaxing is necessary to get them to come to earth. In war, such delay in delivering a vital and urgent message might be disastrous.

This difficulty is overcome by teaching young birds that a good feed is always ready when they return to the home loft. When this lesson has been learnt there is far less desire to waste time after a long and gruelling flight.

Birds for use with the Army have to become accustomed

The wireless operator attaches the aluminium message container to the leg of a pigeon before releasing it from a flying boat.

PIGEONS AS BIRDS OF WAR

to the flame, noise, smoke and general havoc of the battlefield. Grand firework displays are, therefore, put on specially for the birds' benefit. As pigeons are used both in tanks and submarines, some birds have to become accustomed to the peculiar conditions obtaining in both these engines of war.

Delayed Drops

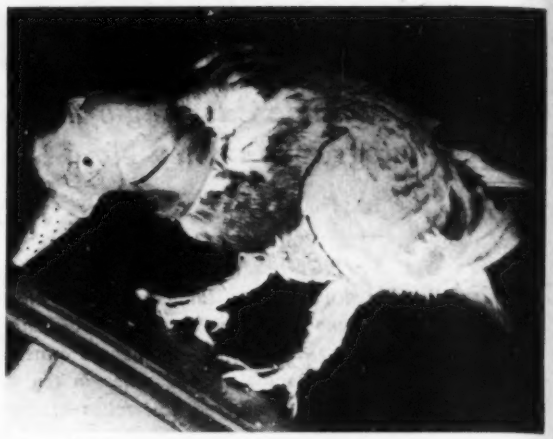
Birds which are to be used in aircraft have to undergo further training. After ordinary practice trips the pigeons are taken out to sea in specially detailed aircraft and then released. New birds always try to fly immediately on release. The result is lost feathers, due to the slipstream from the airscrews. But the birds quickly learn, and "old hands" keep their wings closed until they are clear of the plane.

The success of a well-trained pigeon as a message-carrier can be gauged from the following facts. Records of the U.S. Army Signal Corps show that during the last war over 90 per cent. of all the messages entrusted to their pigeons were delivered. This is a higher record of success than that achieved by any other form of military communication.

In this war, during a period of six months, 307 out of 320 messages sent from aircraft by pigeons were safely delivered. Among these messages were several SOSs and reports on enemy activities which it was dangerous to trust to wireless.

And these successes are often achieved in the face of great odds. One bird flying home from Norway had to cross the North Sea in the teeth of a blizzard. The pigeon delivered the message, but it died of strain shortly afterwards.

American paratrooper about to drop the pigeon container overboard. It is attached by a static line which opens the parachute.



Prepared for all eventualities. A Swiss pigeon in gas mask is able, if necessary, to fly through clouds of poison gas.

Sometimes during the last war the release of a pigeon from a beleaguered position was the signal for every gun, rifle and automatic weapon possessed by the enemy to be loosed off in an attempt to bring the bird down.

The birds were assailed by clouds of poison-gas, enemy snipers, and even trained falcons which were trained to fly against them in attempts to prevent vital messages from reaching the base. Yet the pigeons got through.

Take as an outstanding example of a Service pigeon's "devotion to duty" Pigeon No. 2,709, IXth Corps. This gallant bird was killed in action, but not before it had struggled home to its loft, delivered its last message and won the Victoria Cross. Now its blood-stained body rests in a glass case at the Royal United Services Institution. Around its breast is hung the world's highest award for gallantry, and on a plaque can be read these words:—

> "In the action which was fought in the region of the Menin Road on October 3, 1917, this bird was dispatched from the front line to Divisional H. Q. at 1.30 p.m. The bird was hit by a bullet, which broke one of its legs, drove the message-carrier into its body, and passed out through the neck. In spite of wounds and being out in the wet all night, the bird struggled home to its loft, a distance of nine miles, and delivered its message at 10.53 a.m., October 4. It died shortly afterwards."

The messages which the pigeon is to carry are attached to it in several ways. One way was to fasten the message to the bird's tail feathers, but this method has been superseded by slipping messages written on thin, tough tissue into a small aluminium capsule sealed to the bird's leg.

Airgraphs in 1870

If a photograph or bulky message is to be sent, the package can be fastened about the bird's breast. In this method care must be taken to see that the pigeon's wing movements are not hampered or wind resistance increased. As long ago as 1870, during the Franco-Prussian War, airgraphs were in use in connection with the pigeon-post from beleaguered Paris. To-day, of course, photographically reduced messages are often sent by Service pigeons. 30,000 words is the record carried by a bird in a single flight.

But the war services of pigeons are not confined to message-carrying. Both the Germans and Japanese are reputed to be using Neubronner's panoramic camera to obtain aerial pictures by pigeons. Such ingenuity on the part of the Japanese can well be understood, for they have already been reported to be using bees to carry tiny messages in the same way as homing-pigeons!

In a recent article in an American periodical Rory O'Shane has the following interesting passage on the U.S. Army's pigeons: "The Signal Corps is aware of the possible application of the pigeon to aerial photography, but as yet no formal adoption of this method of combat reconnaissance has been made.

PIGEONS AS BIRDS OF WAR

"One of the devices for taking aerial photographs by pigeon consists of a tiny 2in. aluminium camera which is attached to the pigeon's breast with an elastic band. As the pigeon soars over the countryside, two inset cameras, one working forward and the other backward, snap two dozen exposures at regular intervals.

"The mechanism of this camera consists of a tiny rubber ball operating a small lever connected to the shutter. The rush of air passing through the ball, releases the lever, thus clicking the shutter, and the pigeon brings back to General Headquarters an excellent idea of enemy terrain, position of troops and location of batteries."

Since the last war revolutionary progress has been made in pigeon science. It is not so many years ago that a sustained homing flight of 200 miles in a day and a mile-a-minute clip were considered outstanding performances by any pigeon. Now, 500 mile-a-day trips, and bursts at over 70 m.p.h. are common among the best pigeons.

But the modern training of pigeons has not stopped at improving their natural capabilities—new flying qualities altogether, of great importance to message-carrying in wartime, have been bred in a few selected strains.

It is now possible to obtain pigeons which will fly at night, make a round trip, thus making it possible for the same pigeon to deliver a message and then fly back with the answer, and return to a base which has been moved for a distance of several miles after the bird has been released. And when, in one bird, can be combined night-flying, two-way message-carrying to movable bases, a weapon will have been forged which has been the dream of Army Commanders since the dawn of organised warfare.

But even without these refinements the homing-pigeon which is at the disposal of the Armed Forces of to-day is a very efficient bird. And as a French General once remarked: "No wires to string, no big plants, no necessity for lives lost, as linesmen work under fire—and no expense. All he asks is a little affection and a few handfuls of corn."

(Left) Some American paratroopers carry pigeons in special jackets, to be released with reports when the paratrooper has landed. (Right) Pigeons released from a shore loft in the course of their training. Before the war pigeons were being trained at Calshot.

DE HAVILLANDS IN NEW ZEALAND

Located on the Rongotai airfield, near Wellington, the De Havilland works as seen from the air in the days before the war. Large numbers of Tiger Moths have been built there, and engine overhaul is also undertaken. Last week we published a picture of the Governor-General, Sir Cyril Newall, and Lady Newall, inspecting some of the work done.

The Piaggio 108

Unusual Armament Layout : German Fittings Among the Equipment : Interior Arrangements Good, but Some Crudities

The Piaggio 108 flown by Lt. Benedict from Taranto airfield.

THE co-belligerency of Italy has enabled a number of the *Regia Aeronautica's* latest types of aircraft to be examined while in perfect flying condition, and an interesting example is the Piaggio 108 four-engined heavy bomber.

The particular example under review was flown from an airfield near Taranto by Lt. Benedict, of the U.S.A.A.F., who, not unnaturally, compared it with the Flying Fortress, which, he says, it resembles in certain respects; it has somewhat similar external lines to the earlier Fortress I, its wing loading is approximately the same, and its handling characteristics do not greatly differ from those of its American "opposite number."

Where it does strike a novel note to Anglo-American eyes, however, is chiefly in the matter of defensive armament which seems to have been designed on the assumption that head-on attacks would rarely, if ever, be encountered.

Gun Turrets

Most curious of all in this respect is the mounting of two 14 mm. machine guns firing to the rear from a remotely controlled turret above each of its outer engines, whilst almost equally unique is the mounting of two small dorsal power-operated gun turrets, each with two machine guns, very close together, in tandem, almost amidships. The rest of the armament comprises a retractable "dust-bin" turret beneath the centre of the fuselage, and a pair of waist guns. There is, it will be noted, no forward turret nor guns in wings or nose. Incidentally, all guns are of 14 mm. calibre, and the single one in the "dust-bin" turret is aimed through a reflector sight. The idea behind the twin dorsal turrets would appear to be for meeting attacks coming simultaneously from two different directions, the forward turret presumably taking care of attacks from in front of the lateral centre-line, and its partner dealing with those from behind it.

Provision is made to carry either three tons of bombs or three 18in. torpedoes, one situated centrally and two hung on either side of the catwalk which runs above the central torpedo bay, but according to the Italian pilot who had previously been in command of this machine, it had never actually carried anything but bombs.

German Equipment

Another illuminating fact about this aircraft was the inclusion of a number of items of German equipment, such as the auto-pilot, master compass and high-frequency boost coil, while the whole of the wiring was done on the German method of having a particular colour for each separate system.

Crew positions were generously protected with a great deal of armour plating, and the interior arrangements generally were good and designed to make the crew as comfortable as possible within practical service limits. But there were, on the other hand, certain crudities which, Lt. Benedict pointed out, would never be found on an American aircraft. Examples of this were the arrangements for starting the engines and operating the flaps. The former operation depended upon a supply of only two horse-power and consequently it took a good 20 min. to get all four engines going. The flaps relied on bottle pressure which is, of course, a very vulnerable source of energy for a military aircraft to employ, and one can imagine some hectic landings as a result of its failure after damaging "enemy action."

Nevertheless, Lt. Benedict spoke well of the Piaggio's normal behaviour as an aircraft. It flew well, he said, and landed nicely. Take-off speed was about 90 m.p.h., cruising speed from 175 to 180 m.p.h. and normal range about 1,000 miles. The total fuel consumption rate of the four Piaggio 1,300 h.p. air-cooled, radial engines was 240 gal./hr. Top speed is said to be 290 m.p.h. at 11,480ft., and the service ceiling 26,000ft.

SPANISH AND MEXICAN TRAINERS

A NEW training aircraft recently introduced in the flying schools of the Spanish Air Force is the H.M.-1. This is a cantilever two-seater low-wing monoplane, powered with an air-cooled in-line engine. Wings in trapezoid plan have rounded tips, a moderate dihedral angle from the roots, and are equipped with landing flaps. The undercarriage is fixed, with faired wheels.

Without disclosing the power plant, the Spanish Air Ministry gives the following particulars of the dimensions and performance of the aircraft: Span, 31.66ft.; length, 25.10ft.; height, 7.22ft.; and wing area 150 sq. ft. Empty weight is 1,344 lb., disposable load 500 lb., and flying weight 1,873 lb. Maximum speed is stated as 140 m.p.h., minimum speed with flaps 44 m.p.h. (without flaps 55 m.p.h.). Ceiling is 16,400ft. and range 430 miles. Rate of climb is 3,200ft. in three minutes.

From Mexico comes news of a locally built trainer, the "Teziutlan," reported to be in production at the State controlled aircraft plant in Mexico City.

The Teziutlan is a cantilever low-wing monoplane built in mahogany plywood. Ninety-four per cent. of the material used in construction, including all accessories, are of local design and manufacture, only its four-cylinder Lycoming Boxer engine of 125 h.p. being imported from the U.S.

Of special interest is the unusual tail unit arrangement which features a slotted tailplane, one section of which can be moved over a limited angle for trim adjustment.

The Teziutlan has a span of 38ft., length 23.9ft., height 6.23ft. Empty weight is 950 lb. and flying weight 1,630 lb. Range is 480 miles, top speed 108 m.p.h., and cruising speed 102 m.p.h. It climbs at 1,370ft./min. and the ceiling is 22,000ft.

SERVICE AVIATION

Royal Air Force and Fleet Air Arm News and Announcements

PRECISION AND SATURATION : Short Stirlings seen under the wing of a Fortress at a bomber station in Britain.

The Prime Minister's Message to Bomber Command

"THE War Cabinet have asked me to convey to you their compliments on the recent successes of Bomber Command, whose deeds in the first week of October mark yet another stage in the offensive against Germany.

"The War Cabinet realise that the results of this campaign are not restricted to damage which can be seen and photographed, but are reflected with equal significance in the extent to which the German Air Force has been forced from the offensive to the defensive, both operationally and in new construction, and compelled to concentrate more and more of its resources on the protection of Germany against bombing attacks from the West, to the benefit of our own and allied forces on the other European fronts.

"Your command, with the day-bomber formations of the Eighth Air Force fighting alongside it, is playing a foremost part in the converging attack on Germany now being conducted by the forces of the United Nations on a prodigious scale. Your officers and men will, I know, continue their efforts in spite of the intense resistance offered until they are rewarded by the final downfall of the enemy.

"These growing successes have only been achieved by the devotion, endurance, and courage for which Bomber Command is renowned. Airmen and airwomen of Britain, the Dominions, and our allies have worked whole-heartedly together to perfect the mighty offensive weapon which you wield in a battle watched by the world.

"I request you to bring this message to the attention of all members of your command."

The following reply has been addressed by Air Chief Marshal Sir Arthur Harris to the Prime Minister:—

"All ranks of Bomber Command are greatly heartened by the message conveyed by you from the War Cabinet. With your unfailing encouragement which armed and supported us through our darkest hours we proceed with our task determined to speed the issue and assured of the outcome. It is an unfailing source of strength to us and, I well know, to our brothers in arms of the 8th United States Bomber Command to realise, as we do, that every bomb which leaves the racks makes smoother the path of the armies of the United Nations as they close in to the kill."

Transport Command Appointment

Acting Air Vice-Marshal A. C. COLLIER, C.B., C.B.E., has been appointed to be Deputy Air Officer Commanding-in-Chief Transport Command. Air Vice-Marshal Collier has been air officer in charge of administration, A.H.Q., India, since 1942.

Promotions

GENERAL DUTIES BRANCH.

Air Comdre. F. L. HOUPE, C.B.E., A.F.C., to be Act. Air Vice-Marshal. July 28th, 1943.

Air Commodores (temp.) are granted the rank of Group Captain (war substn.).

R. IVELAW-CHAPMAN, C.B.E. August 1st, 1943
S. D. MACDONALD, D.F.C. August 15th, 1943
T. C. TRAILL, O.B.E., D.F.C. August 21st, 1943.
A. P. DAVIDSON C.B.E. August 21st, 1943

TECHNICAL BRANCH.

Air Comdre (temp.) K. M. St. C. G. LEASK, M.C. is granted the rank of Air Comdre. (war substn.). August 21st, 1943

Awards

Fleet Air Arm

THE KING has been graciously pleased to approve the following awards:

For skill and efficiency in many air operations against the enemy while operating from Malta:

Bar to Distinguished Service Cross

Temp. Sub. Lt. (A) T. BARR, D.S.C., R.N.V.R.

Distinguished Service Cross

Temp. Lt. (A) S. J. BARKER, R.N.V.R.
Temp. Sub. Lt. (A) R. H. CHALKER, R.N.V.R.
Temp. Sub. Lt. (A) G. RUSSELL-JONES, R.N.V.R.

Mention in Despatches

Temp. Lt. (A) T. C. CHAPMAN, R.N.V.R.
Temp. Lt. (A) P. F. MOURITZ, R.N.V.R.

Royal Air Force

THE KING has been graciously pleased to approve the following awards in recognition of distinguished service with the R.A.F.:—

Distinguished Flying Cross

F/O. F. G. SPANNER, R.C.A.F., No. 207 Sqn.
F/O. J. C. STEAD, R.A.F., No. 100 Sqn.
F/O. J. L. S. TAYLOR, R.A.F., No. 78 Sqn.
F/O. R. F. W. TURNER, R.A.F.V.R., No. 83 Sqn.
F/O. F. H. W. UNWIN, R.A.F., No. 103 Sqn.
F/O. D. A. H. WALKER, R.A.F.V.R., No. 44 Sqn.
F/O. R. H. WILLIAMS, R.A.F.V.R., No. 61 Sqn.
F/O. G. WOOD, R.A.F.V.R., No. 103 Sqn.
F/O. O. W. WOOD, R.N.Z.A.F., No. 101 Sqn.
P/O. J. R. AFFLECK, A.F.M., R.A.F.V.R., No. 161 Sqn.
P/O. K. B. BEARDSALL, R.A.F.V.R., No. 103 Sqn.
P/O. S. BOCZAR, R.C.A.F., No. 9 Sqn.
P/O. G. F. BRANTINGHAM, R.A.F.V.R., No. 97 Sqn.
P/O. D. J. BUCHANAN, R.C.A.F., No. 101 Sqn.
P/O. J. E. CAMPBELL, R.A.F.V.R., No. 106 Sqn.
P/O. E. J. CANTON, R.A.F.V.R., No. 77 Sqn.
P/O. J. P. H. CARRERE, R.C.A.F., No. 9 Sqn.
P/O. J. O. CHRISTIE, R.C.A.F., No. 50 Sqn.
P/O. A. CLARK, R.A.F.V.R., No. 61 Sqn.
P/O. M. W. COLES, R.C.A.F., No. 115 Sqn.
P/O. J. G. DAVIS, R.A.F.V.R., No. 158 Sqn.
P/O. R. H. Dean, R.A.F.V.R., No. 7 Sqn.
P/O. J. D. DICKSON, R.C.A.F., No. 419 (R.C.A.F.) Sqn.
P/O. B. C. DREAVER, R.N.Z.A.F., No. 49 Sqn.
P/O. A. K. DUNCAN, R.A.F.V.R., No. 466 (R.A.A.F.) Sqn.
P/O. E. G. DUNDAS, R.C.A.F., No. 61 Sqn.
P/O. E. R. EVANS, R.C.A.F., No. 90 Sqn.
P/O. H. W. FENTON, R.C.A.F., No 405 (R.C.A.F.) Sqn.
P/O. G. K. FINNIE, R.C.A.F., No. 83 Sqn.
P/O. P. A. FINNETT, R.A.F.V.R., No. 51 Sqn.
P/O. R. A. FROST, R.A.F.V.R., No. 61 Sqn.
P/O. J. L. FULSHER, R.C.A.F., No. 77 Sqn.
P/O. G. L. GLOVER, R.C.A.F., No. 101 Sqn.
P/O. H. W. E. HAMMOND, R.C.A.F., No. 109 Sqn.
P/O. H. F. HAND, R.A.F.V.R., No. 158 Sqn.
P/O. R. HARLING, R.C.A.F., No. 419 (R.C.A.F.) Sqn.
P/O. H. K. C. HARVEY, R.C.A.F., No. 100 Sqn.
P/O. J. R. HEWITT, R.A.F.V.R., No. 44 Sqn.
P/O. D. HUTCHINSON, R.A.F.V.R., No. 102 Sqn.
P/O. E. A. JOHNSON, R.A.F.V.R., No. 427 (R.C.A.F.) Sqn.
P/O. P. J. KENNEDY, R.A.F.V.R., No. 158 Sqn.
P/O. R. W. LEWIS, R.A.F.V.R., No. 214 Sqn.
P/O. H. H. MCDANIELL, R.C.A.F., No. 10 Sqn.
P/O. C. A. MACDONALD, R.A.F.V.R., No. 57 Sqn.
P/O. N. C. RICHARDS, R.A.F.V.R., No. 81 Sqn.
F/O. J. A. A. M. DAVID, R.A.F.V.R., No. 76 Sqn.

Distinguished Flying Medal

Flt. Sgt. E. M. MCARTHUR, R.C.A.F., No. 405 (R.C.A.F.) Sqn.
Flt. Sgt. W. P. M. MCINTOSH, R.C.A.F., No. 35 Sqn.
Flt. Sgt. N. MAITCH, R.N.Z.A.F., No. 35 Sqn.
Flt. Sgt. D. B. MOODIE, R.A.A.F., No. 460 (R.A.A.F.) Sqn.
Flt. Sgt. J. R. MOORE, R.A.F.V.R., No. 101 Sqn.
Flt. Sgt. W. A. MOYES, R.A.F., No. 218 Sqn.
Flt. Sgt. S. H. NUTTING, R.C.A.F., No. 405 (R.C.A.F.) Sqn.

Flt. Sgt. A. G. OSBORN, R.A.A.F., No. 460 (R.A.A.F.) Sqn.
Flt. Sgt. A. G. PARSONS, R.A.F.V.R., No. 50 Sqn.
Flt. Sgt. J. H. PETERSON, R.A.A.F., No. 460 (R.A.A.F.) Sqn.
Flt. Sgt. P. W. PHILLIPS, R.A.F.V.R., No. 172 Sqn.
Flt. Sgt. F. J. POOLE, R.A.F., No. 61 Sqn.
Flt. Sgt. B. G. ROE, R.A.F.V.R., No. 466 (R.A.A.F.) Sqn.
Flt. Sgt. D. A. ROUTEN, R.A.F.V.R., No. 7 Sqn.
Flt. Sgt. H. E. S. SAMME, R.A.F.V.R., No. 83 Sqn.
Flt. Sgt. W. SHAKESPEARE, R.A.F., No. 432 (R.C.A.F.) Sqn.
Flt. Sgt. R. R. STAIN, R.A.A.F., No. 460 (R.A.A.F.) Sqn.
Flt. Sgt. C. J. STOKES, R.A.F.V.R., No. 7 Sqn.
Flt. Sgt. H. S. TUCKER, R.A.F.V.R., No. 51 Sqn.
Flt. Sgt. W. L. VANDER-DASSON, R.C.A.F., No. 619 Sqn.
Flt. Sgt. H. R. WELCH, R.C.A.F., No. 405 (R.C.A.F.) Sqn.
Flt. Sgt. A. B. WELFORD, R.A.F.V.R., No. 57 Sqn.
Flt. Sgt. M. J. WELLS, R.N.Z.A.F., No. 12 Sqn.
Flt. Sgt. W. H. WHITE, R.A.F.V.R., No. 467 (R.A.A.F.) Sqn.
Flt. Sgt. F. WILLIAMS, R.A.F.V.R., No. 78 Sqn.
Sgt. C. A. FISHER, R.C.A.F., No. 502 Sqn.
Flt. Sgt. W. J. KIRK, R.A.F., No. 10 Sqn.
Flt. Sgt. W. BIGGS, R.A.F.V.R., No. 427 (R.C.A.F.) Sqn.
Sgt. J. ELLIOTT, R.A.F.V.R., No. 427 (R.C.A.F.) Sqn.
Sgt. L. E. MOYLER, R.A.F.V.R., No. 427 (R.C.A.F.) Sqn.

THE KING has been graciously pleased to approve the following awards:—

O.B.E. (Mil.)

Act. Sqn. Ldr. L. W. W. MODLEY, R.A.F.—In April, 1943, an aircraft crashed in a field near a R.A.F. Station. Sqn. Ldr. Modley, the commanding officer of the station, immediately went to the scene. Disregarding a furious fire in the front of the aircraft, he entered the wreckage and passed the body of one of the crew through a hole in the fuselage to three airmen. Sqn. Ldr. Modley then attempted to extricate a second body, which was pinned under the wreckage, but the heat of the spreading fire and exploding ammunition compelled him to abandon the attempt.

M.B.E. (Mil.)

Act. Flt. Lt. T. J. PARRINGTON, R.A.F.V.R.—One night in May, 1943, an aircraft struck a hangar and crashed in flames. Flt. Lt. Parrington arrived at the scene on a motor cycle, and, ignoring the fury of the fire, went into the flames and, after hacking away the cockpit hood, succeeded in extricating the injured pilot. Flt. Lt. Parrington undoubtedly saved the life of the pilot by his prompt effort. He sustained burns to his right hand in carrying out the rescue.

B.E.M. (Mil.)

Cpl. T. L. JOHNSON, R.A.F., and A/C.2 R. B. PARTON, R.A.F., both of No. 165 Sqn.—In January, 1943, an aircraft stalled and crashed on the airfield and burst into flames on impact. Although the wreckage was blazing furiously and there was grave danger of petrol tanks and ammunition exploding, A/C. Parton entered the flames to help the injured pilot. Driven back by the heat of the fire, he again entered the flames. He received assistance from Cpl. Johnson, and together these airmen, who showed great courage and complete disregard of their own safety, succeeded in extricating the pilot from the wreckage. Their courage and prompt action helped to save the life of the pilot.

Air Training Corps watching glider flying which, where possible, forms part of their training.

SERVICE AVIATION

Roll of Honour

Casualty Communiqué No. 294.

The Air Ministry regrets to announce the following casualties on various dates. The next of kin have been informed. Casualties "in action" are due to flying operations against the enemy; "on active service" includes ground casualties due to enemy action, non-operational flying casualties, fatal accidents and natural deaths.

Of the names in this list 103 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Flt. Lt. G. F. Davey; Flt. Sgt. J. K. G. Freeland; Flt. Sgt. A. V. House; Flt. Sgt. J. Marshall; Sgt. E. A. Phillips; L.A/C. L. L. Scott; Flt. Sgt. N. C. Taylor.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—P/O. E. G. Clegg; Sgt. H. G. Ford; Sgt. J. Hill; P/O. C. W. Kaye; F/O. J. W. Lynes; Flt. Sgt. R. Marsh; Sgt. H. B. Stokes; Sgt. J. Sykes; Flt. Sgt. W. C. Turner; Sgt. E. F. Turton; Sgt. J. W. Tyreman; Sgt. J. Walder; Sgt. G. C. Wing.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. G. Bagshaw; Flt. Sgt. J. F. C. Ballantyne; Sgt. G. G. M. Battison; Sgt. D. B. Beales; Sgt. E. O. P. Bell; Sgt. J. M. M. Billing; F/O. E. B. Bowen; P/O. D. J. Bradshaw; Sgt. B. Briscoe; Flt. Sgt. S. F. B. Bryant; P/O. E. S. Burrows; P/O. P. M. Burton; Sqn. Ldr. J. N. G. Carter; Flt. Sgt. J. P. Carter; Sgt. W. G. Chapman; Sgt. J. C. Chittick; Sgt. J. A. Clough; Sqn. Ldr. K. D. Currie; Sgt. F. V. Dacey; P/O. W. R. N. Davidson; Sgt. L. A. Davies; Sgt. D. H. Davison; Sqn. Ldr. G. A. Denby, D.F.C.; Sgt. P. W. Ditchburn; Sgt. R. G. Evison; Sgt. A. B. Fawcett; Sgt. L. P. J. French; F/O. M. H. Good; Flt. Sgt. C. A. Green; F/O. B. A. F. Cuddon; Sgt. L. S. Harrington; Sgt. P. Hayward; Sgt. C. Heskel; Sgt. A. J. Hill; Sgt. C. S. H. Hill; F/O. R. D. Hill; Flt. Sgt. S. H. Hopkinson; Flt. Sgt. G. D. Hudson; Flt. Sgt. J. P. Iredale; Sgt. W. J. Jarvis; F/O. F. T. Keeping; Sgt. W. M. Knowles; Sgt. C. R. Long; Sgt. T. A. Lyke; Sgt. D. P. McAleese; Sgt. E. Mackay; Flt. Sgt. W. H. Mackintosh; Sgt. S. R. Mason; Flt. Sgt. P. H. Murray; Flt. Lt. W. Nicholls, D.F.C.; Sgt. W. Osborn; Sgt. S. Posner; P/O. W. F. Rains; F/O. R. R. Sargent; P/O. D. V. Smith; Sgt. E. P. Smith; Sgt. J. J. Smith; Sgt. J. L. Strachan; Sgt. W. T. Taylor; Flt. Sgt. G. T. Vuilleumier; P/O. R. S. Watson; Sgt. F. H. K. Watt; Sgt. H. T. Williams; Sgt. R. H. Williams.

WOUNDED OR INJURED IN ACTION.—Sqn. Ldr. F. T. Gardiner.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. C. A. Bailey; Sgt. H. G. Bartle; F/O. G. McF. Clarke; Sgt. D. Harrison.

MISSING.—Act. Sqn. Ldr. C. F. Andrew, D.F.C.; Sgt. F. Ball; F/O. R. G. Ballantine; Sgt. R. M. Bowyer; Flt. Sgt. G. A. Briggs; Sgt. C. D. Brown; Sgt. L. Brown; Sgt. T. Campbell; Sgt. R. J. Chapman; Sgt. E. A. Charles; Sgt. J. Clark; Sgt. C. F. Coade; Sgt. L. Cocking; Act. Flt. Lt. E. R. F. Cooke; Flt. Sgt. G. M. Crawford; Sgt. J. Cumming; F/O. C. Daniel; Sgt. G. C. Davies; F/O. J. W. I. Day; Act. Flt. Lt. L. C. Dive-Robinson; Flt. Sgt. J. D. Dodds; Flt. Sgt. C. T. W. Downing; P/O. W. F. Drew; Flt. Sgt. J. A. Dunbar; Sgt. H. J. Earl; Sgt. C. Eden; Flt. Sgt. F. H. Ellacott; Sgt. R. C. G. Evans; Sgt. D. C. Fentiman; Sgt. R. S. Fish; Sgt. R. Foster; Act. Flt. Lt. C. W. Fox; P/O. S. F. N. Fox; Sgt. J. Galloway; Sgt. J. S. Gaston; Sgt W. E. Goodacre; F/O. R. E. Goodwin; Flt. Sgt. M. T. T. Hall; F/O. G. N. Hammond; P/O. E. H. M. Harbour; P/O. W. H. Hodson; Sgt. C. D. Hughes; Sgt. T. I. Hughes; Sgt. T. S. James; Sgt. L. J. Jones; Sgt. D. MacDonald; Flt. Sgt. T. A. MacQuarie; P/O. N. Manifold; P/O. D. J. Marks; Sgt. J. Marshall; Sgt. R. H. Morgan; Sgt. J. R. Nicholls; Flt. Lt. H. C. Pexton; P/O. J. M. Phillips; Act. Flt. Lt. J. A. Philps; Sgt. R. S. Pickard; Sgt. J. Piper; P/O. D. L. A. Pool; F/O. A. Fyrah; P/O. F. S. Ralph; Sgt. H. E. Richardson; Sgt. H. Roberts; Sgt. T. N. Robinson; P/O. A. A. Rossie; Sgt. S. E. Russell; Sgt. C. F. Sargent; P/O. D. G. Scruton; Act. Flt. Lt. B. F. Smith, D.F.C.; Flt. Sgt. W. E. Smith; Act. Flt. Lt. W. J. Smith, D.F.C.; Sgt. E. T. C. Street; Sgt. R. Sumner; Flt. Sgt. R. E. Tinham; Sgt. J. F. A. Trebearn; Sgt. P. H. Unwin; Sgt. W. D. P. Walters; Sgt. W. Warrington; Sgt. F. H. Webb; Sgt. A. E. G. White; Sgt. C. G. Whiteley; F/O. A. J. Willcock; Sgt. J. R. S. Williams; Sgt. E. F. J. Willis; Sgt. G. P. Woodruffe; Sgt. E. E. Wright; Sgt. T. S. Yarwood.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—P/O. A. W. Gooding; Cpl. W. Holliday; A/C.2 S. J. Woodhams.

KILLED ON ACTIVE SERVICE.—Sgt. R. Clements; Flt. Sgt. R. W. Bagley; Sgt. E. D. T. Barff; Sgt. W. A. Chamberlain; Sgt. J. J. Davidge; P/O. R. W. Ellis; Sgt. K. A. Gooding; Sgt. H. Green; Flt. Sgt. J. Hollingsworth; Sgt. E. L. Kemp; Sgt. K. McKenzie; P/O. I. B. Mann; L.A/C. A. L. Marshall; Sgt. S. J. Morton; Flt. Sgt. P. J. Newbery; Sgt. C. S. Newton; Flt. Sgt. J. N. O'Brien; Sgt. R. A. Owens; L.A/C. W. T. Peverell; Sgt. R. W. B. Pimm; Sgt. R. W. J. Reeve; F/O. T. G. Rodgers; Sgt. A. J. Shorter; Sgt. A. P. Walker; W/O. I. Wallace-Cox; Flt. Sgt. J. A. Watkins; Sgt. R. A. Young.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Flt. Lt. C. A. Blackburn.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. H. H. Barker; Sgt. A. Bateman; Sgt. E. Clarke Sgt. H. W. Goodman; Sgt. D. M. Hancock; Sgt. H. Newell.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Sgt. B. G. Nichols; Flt. Sgt. J. O'Hara.

PREVIOUSLY REPORTED WOUNDED OR INJURED ON ACTIVE SERVICE, NOW REPORTED DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—F/O. E. B. Blackburn.

DIED ON ACTIVE SERVICE.—L.A/C. J. H. Arthur; L.A/C. F. D. Barton; L.A/C. H. Clegg; Sgt. B. D. Haldane; A/C.2 G. K. Matthews; A/C.1 H. L. Morris; Sgt. S. Packham; L.A/C. H. T. Perks; Sgt. T. J. Perrin; W/O. W. A. Pocock; Flt. Lt. A. M. Thomson; L.A/C. H. Vail.

Women's Auxiliary Air Force

DIED ON ACTIVE SERVICE.—A/CW.2 M. F. Hayter.

Royal Australian Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. A. R. G. Hart; Sgt. W. E. Lodge; Sgt. K. G. Pearce; Sgt. C. B. Sautelle.

MISSING.—Flt. Sgt. R. M. Burcher; Flt. Sgt. P.A. Fraser; F/O. A. J. Johnson; Flt. Sgt. P. L. Jones; F/O. C. T. O'Riordan; F/O. P. S. A. St. Ledger; F/O. A. F. Williams.

Royal Canadian Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—F/O. S. L. McBurney; Flt. Sgt. L. E. Thorneycroft.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. L. J. Corvey; Flt. Sgt. W. F. Gordon.

MISSING.—Sgt. B. O. Anderson; Sgt. W. G. Arlidge; P/O. R. C. Baillie; Sgt. D. H. Bates; F/O. J. Bennett; Sgt. F. H. Bowcock; Sgt. E. C. Bray; F/O. W. J. Cameron; Sgt. J. M. Church; P/O. A. L. Forbes; Wing Cdr. H. W. Kerby; Sgt. W. M. T. Hetherington; Sgt. D. N. Hunter; P/O. V. J. Jewell; Sgt. L. J. Johnson; Sgt. C. E. Morrow; P/O. P. S. Murphy; Sgt. G. C. Nault; Sgt. L. J. R. A. Pelland; F/O. D. E. Pushor; P/O. M. C. Staples; Sgt. A. Veraas; Sgt. G. H. Woodcock.

KILLED ON ACTIVE SERVICE.—Sgt. G. A. Long.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Sgt. N. R. McKinley.

Royal New Zealand Air Force

KILLED IN ACTION.—F/O. N. A. Gardiner.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. F. W. Norris.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. J. D. Gould; Sgt. R. J. F. Hirst; Flt. Sgt. P. D. Lowther; Sgt. S. C. Smith; Sgt. J. C. Wilmshurst.

MISSING.—Flt. Sgt. J. N. Darney; Flt. Sgt. R. J. Stone; Flt. Sgt. T. J. Vercoe.

South African Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Air Sgt. A. M. C. P. Donald; Air Sgt. P. N. Gray; Lt. Le Brooks.

Casualty Communiqué No. 295.

Of the names in this list, 106 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Sgt. K. H. Francis; Sgt. S. C. Hasler; Sgt. J. S. Lockwood; Sgt. W. F. O. Sayle; Sgt. E. R. Widdows.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. G. S. Anderson; Flt. Sgt. L. A. Biggin; Sgt. R. A. F. Bignell; Sgt. P. Brogan; F/O. J. A. Bruce; Sgt. A. Howison; Sgt. F. V. Lamb; Sgt. M. MacLellan; Sgt. W. T. McLennan; Act. Sqn. Ldr. R. L. Mannix; Sgt. F. W. Morris; Sgt. R. McL. Paterson; Sgt. F. N. Skinner; Sgt. G. A. Wainwright; Sgt. R. Wardrop; Sgt. E. J. D. Watt; Sgt. S. J. Wick.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. C. Aitken; Sgt. W. J. Aitken; Sgt. C. N. Anderson; Act. Flt. Lt. J. C. Atkinson; P/O. J. Barrit; F/O. F. Buchanan; Sgt. A. E. Burkitt; Sgt. G. A. Bushnell; Flt. Sgt. A. M. Camplin; Sgt. J. P. Canavan; Sgt. C. G. Clegg; Flt. Sgt. A. Comery; Flt. Lt. G. C. Cooke, D.F.C., D.F.M.; P/O. E. T. Daintith; F/O. F. A. Davies; P/O. A. Fennell; Sgt. R. S. Fielding; Sgt. D. G. Gage; Flt. Sgt. A. A. Gillies; Act. Sqn. Ldr. J. R. Goldston; P/O. B. C. Goodwin, D.F.M.; Sgt. F. R. Guppy; Sgt. D. E. Harrison; Sgt. J. Harvey; Sgt. W. J. Higgs; Sgt. S. J. Isaac; P/O. A. Jickling; Flt. Sgt. J. V. Kerr; F/O. B. A. Kirkham; P/O. C. F. Kirkus; Flt. Sgt. B. G. Lough, D.F.M.; Sgt. J. D. Love; P/O. R. H. McLelland; Sgt. F. Martin; Sgt. S. Messham; Sgt. C. Milburn; Sgt. F. Morrell; Sgt. A. E. J. Mortimer; Flt. Sgt. E. D. B. Rae; W/O. A. J. Reid; Sgt. J. M. Reilly; Sgt. M. Reynolds; Flt. Sgt. W. J. A. Spriggs; Sgt. E. F. Stanley; Sgt. J. F. H. Steer; Sgt. P. J. Stokes; Sgt. G. O. Tyler; Sgt. E. J. F. Vick; Sgt. E. Wilde; Sgt. J. B. Williams; Sgt. D. F. Wolf; Flt. Sgt. V. R. Wood; Sqn. Ldr. C. M. Wright; Sgt. P. A. Young.

WOUNDED OR INJURED IN ACTION.—P/O. R. S. N. Brown; Flt. Sgt. J. Wilkinson.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. A. Ashworth; Act. Wing Cdr. J. A. Piddington.

MISSING.—Sgt. H. G. Ansell; Sgt. J. H. Baily; Sgt. J. H. Bassett; P/O. H. O. Batchelor; Sgt. E. J. Bell; Sgt. D. W. Bellamy; Sgt. R. W. Bennett; Sgt. G. Blyth; Sgt. F. Boles; P/O. T. J. Bowling; Sgt. T. Brocklehurst; Sgt. C. F. Brown; Sgt. D. Brown; Sgt. A. W. S. Bundy; Sgt. V. F. Burnett; Flt. Sgt. C. Butterworth; Sgt. C. Button; P/O. R. K. Buxton; P/O. R. McM. Campbell; F/O. G. R. Carpenter; Sgt. S. Chapman; Sgt. N. W. H. Clark; F/O. A. S. Cooke; Sgt. H. W. Cooke; Flt. Sgt. W. A. Davies; Sgt. W. S. Davies; Sgt. D. A. H. Dixon; P/O. W. J. Drew; Sgt. G. W. F. Duckett; F/O. W. W. Dyer; Sgt. L. W. Eade; Sgt. G. W. Farler; Sgt. R. B. Farmery; Sgt. J. W. D. Fletcher; Sqn. Ldr. L. H. Folkard; Sgt. B. Foulston; Sgt. L. F. Freeman; Sgt. D. R. Fry; Sgt. L. E. Fuller; Sgt. J. Graham; Act. Flt. Lt. R. Grundy; Sgt. W. J. Hargreaves; Sgt. J. F. Harkness; Sgt. T. A. Harris; Act. Wing Cdr. W. R. Haskell, D.F.C.; Sgt. L. J. Henley; Sgt. W. H. Hodges; Sgt. G. S. Holloway; Sgt. E. Honeybull; Sgt. R. J. Howell; Sgt. C. F. Hudson; Sgt. G. Humble; Sgt. J. A. Hutchinson; P/O. B. James; Sgt. T. H. R. James; F/O. F. H. Jenkins; Sgt. J. E. John; Sgt. B. S. Johnson; F/O. J. Jones; W/O. J. W. Jones; Sgt. J. T. Jopling; P/O. G. G. Judd; Sgt. A. J. King; F/O. J. Ledgard; Sgt. S. R. Long; Sgt. J. W. Low; Sgt. H. C. Macanninch; P/O. J. F. B. McIntyre; P/O. C. W. A. Manning; Sgt. E. E. Matty; Sgt. E. Middleton; Sgt. L. Myers; Sgt. J. J. Newbon; Sgt. R. E. Newman; Sgt. D. F. Nye; Sgt. T. A. Pargeter; Sgt. D. Parkin; Sgt. R. L. Pasquins; Flt. Sgt. C. J. Peters; Sgt. L. A. H. Petts; Sgt. W. Phillip; F/O. F. Plant; F/O. H. Plant; F/O. L. G. Popperwell; Sgt. A. Purrington; F/O. H. J. Randall; Sgt. D. H. Read; Sgt. J. D. McG. Reid; Sgt. S. I. Rudkin; Sgt. R. O. S. Selwyn; Flt. Sgt. G. B. Silvester, D.F.M.; Act. Sqn. Ldr. F. B. Slade; Sgt. R. W. Slaughter; Flt. Sgt. W. H. Smitham; Sgt. J. W. Sneddon; Sgt. D. S. Somer; Sgt. H. A. Sparrow; Sgt. C. Stancliffe; Sgt. W. J. Stiles; Sgt. R. A. C. M. Stringer; Sgt. A. H. Thompson; Sqn. Ldr. R. N. Todd-White; P/O. T. E. Tomlin; Flt. Sgt. T. Tonkin; Sgt. L. M. Trimmer; Sgt. J. F. Trotter; Sgt. G. A. Walker; Sgt. J. G. Watkins; Sgt. K. E. Watson; F/O. G. W. Webster; Sgt. W. A. Wells; Sgt. H. Wharton; Sgt. A. Whitwam; Sgt. L. C. Wood.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Sgt. E. L. Padfield.

KILLED ON ACTIVE SERVICE.—Sgt. H. J. Evans; P/O. M. D. R. Game; Sgt. E. W. Hirst; Sgt. J. L. Hiscock; L/A/C. K. A. Ing; P/O. C. A. Lambert; F/O. E. J. Needham; Flt. Lt. R. W. Pearson, D.F.C.; Sgt. H. R. Priestman; L/A/C. W. Rees; Sgt. R. Scarston; Sgt. K. G. Slough; Sgt. D. R. Sorensen; L/A/C. J. G. Versturme-Bunbury; Sgt. C. Warburton; Sgt. G. A. Warren; Sgt. E. Watson; Sgt. J. L. Webber; P/O. J. A. Wilkins; P/O. J. R. Wilson.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. T. S. White.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Sgt. W. T. Brown; W/O. S. W. Stanley.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—L.A/C. O. Grimstone.

DIED ON ACTIVE SERVICE.—L.A/C. R. Bottomley; L.A/C. W. H. Clifford; F/O. H. L. Carr; L.A/C. T. A. Davies; Act. Sqn. Ldr. C. F. Green; A/C.1 W. E. Rance; L.A/C. R. Salkeld; A/C.1 A. Sirderfield.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE WHILST PRISONER OF WAR.—L.A/C. W. W. J. Foot; A/C.2 D. H. Fryer; A/C.2 W. Hepperstall; A/C.2 G. Lancaster; A/C.1 W. C. Livett; A/C.1 A. F. Poleykett; L.A/C. L. W. Richardson; L.A/C F. H. Waines.

Royal Australian Air Force

KILLED IN ACTION.—Flt. Sgt. R. G. Salter.

MISSING.—Flt. Sgt. N. W. Buchanan; Flt. Sgt. N. W. Hayter; F/O. P. H. Philips; Flt. Sgt. A. B. Robinson; Flt. Sgt. W. J. Rooke; Flt. Sgt. K. S. Wedgewood.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Flt. Sgt. F. J. Wright.

Royal Canadian Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—P/O. J. H. J. Cholette; Sgt. J. Gardner; Sgt. E. I. Johnston; Sgt. V. F. McHargh; P/O. P. A. G. Martel; Sgt. W. A. L. Masterman; Flt. Sgt. G. J. O'Hanley; Sgt. M. E. Putnam; Flt. Sgt. J. P. A. Raymond; Flt. Sgt. C. W. H. Roy; P/O. A. McL. Skinner; Sgt. R. D. Wiberg.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. W. P. Duthie; Sgt. L. A. Gonnet; Sgt. R. M. Hill; Flt. Sgt. H. W. Laughlan; Sgt. R. Q. Leatherman; Sgt. W. R. MacCosham; Flt. Sgt. J. F. MacDonald; P/O. J. D. MacKenzie; Sgt. R. E. Paudash; Sgt. L. R. Tunney; Sgt. W. J. Wilson.

MISSING.—Sgt. D. C. B. Angus; P/O. K. A. Banks; P/O. J. C. Bradey; Sgt. G. J. Dale; Sgt. W. E. Gimby; Sgt. W. M. Haugen; Sgt. J. L. Lamb; F/O. H. S. McIntyre; F/O. G. B. MacLean; F/O. H. M. Park; Sgt. K. E. Riddell; Sgt. K. E. Schlegel; P/O. G. M. Shouldice; Sgt. L. H. Thompson; Sgt. J. I. Wallner; P/O. P. T. Williams.

KILLED ON ACTIVE SERVICE.—Sgt. W. McK. Arril; Sgt. J. P. L. M. De-Bellefeuille; Sgt. C. M. Johnson; Sgt. J. P. R. Labbe; P/O. N. Solomka; Sgt. F. C. L. J. Therien.

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. G. W. Everett; Sgt. J. W. Fenton; Sgt. S. Holmes; Flt. Sgt. L. C. Shepherd.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Sgt. G. S. Corlett.

MISSING.—Sgt. W. H. J. Bowsher; Flt. Sgt. J. A. Couper; F/O. W. J. Hoy; Flt. Sgt. W. C. Jorgensen; Flt. Sgt. S. C. O. Reeves.

KILLED ON ACTIVE SERVICE.—F/O. D. M. Croy.

South African Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Lt. E. G. Dustow; Lt. M. T. D. Farr; Lt. H. C. Francis; Lt. A. M. L. Johnston; Lt. S. E. Leisegang; Air Sgt. P. J. Swann; Air Sgt. I. E. Van-Graan.

Casualty Communiqué No. 296.

Of the names in this list 100 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Sgt. G. M. Gibbs; Sgt D. T. Jee; Sgt. A. H. Marshall.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—F/O. P. L. Beesley; Sgt. L. J. Bond; Sgt. K. Bowley; Sgt. M. J. Boyle; Sgt. E. Brindle; Sgt. L. Bygrave; Sgt. F. G. Carr; Sgt. E. F. Cowper; Sgt. R. P. Crisp; Sgt. J. A. Daragon; Sgt. P. L. Donald; Sgt. A. Dunbar; Sgt. J. Eastwood; Sgt. F. J. Edwards; F/O. H. A. Evans; Sgt. E. Fish; Sgt. F. J. Fisher; Sgt. A. C. Foxley; Sgt. G. T. Hawkins; Act. Flt. Lt. E. F. G. Healey, D.F.C., D.F.M.; Sgt. C. H. Jurgensen; Sgt. R. Lewis, D.F.M.; F/O. M. H. Lumley; Sgt. R. Muskett; Sgt. A. S. Oakes; F/O. J. H. Pennington, D.F.C.; Sgt. A. D. Rowsell; Flt. Sgt. W. E. Ryan; Sgt. A. Smith; Sgt. E. J. Smith; Sgt. D. J. Thomas; Sgt. F. Trimmer; Sgt. G. W. Whiles; Sgt. W. O. H. Williams; Sgt. J. C. Wood.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. C. F. Abraham; Sgt. F. F. Allen; Sgt. S. A. Bayfield; Act. Flt. Lt. H. J. Beck; Sgt. J. H. Carter; P/O. E. R. Charlesworth; Sgt. W. Cotton; Flt. Sgt. W. H. Cowman; Sgt. R. H. Cox; Sgt. D. S. Coy; P/O. J. P. Cranstoun; Sgt. J. G. Dawson; Flt. Lt. A. G. Donahue, D.F.C.; P/O. A. R. Eckton; P/O. W. R. Foxlee; F/O. C. J. J. Gill; Sgt. J. Hillhouse; P/O. W. D. Hollis; Sgt. A. W. Hover; Sgt. H. E. Johnson; Sgt. J. Langrell; Sgt. S. F. McLean; Sgt. N. Marshall; Sgt. C. H. Mitton; F/O. K. L. Morgan; Sgt. H. D. Munro; Sgt. J. Murtagh; Flt. Sgt. J. R. Orr; Sgt. A. R. Parker; Sgt. W. H. Pates; P/O. R. M. Patterson; P/O. A. H. G. Paxton; Sgt. R. J. P. Salt; Sgt. D. M. Sannholm; F/O. F. P. Saunders; P/O. N. F. Sibley; Sgt. R. Stone; Sgt. B. M. Swallow; Sgt. H. Taylor; Sgt. P. R. Trevayne; Sgt. B. K. Trubshaw; Flt. Lt. J. H. Wetherly; Sgt. A. H. J. Whittle; Sgt. H. L. Williams; Sqn. Ldr. M. A. L. Williams; Sgt. G. E. Young.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—Sgt. R. A. Atterton; P/O. P. H. Laycock.

WOUNDED OR INJURED IN ACTION.—F/O. J. Cotter; Sgt. W. L. Porcher.

Glider office. A peep through the door of an Airspeed Horsa into the pilots' cockpit. The instruments include: Airspeed indicator, artificial horizon, altimeter, sensitive altimeter and turn-and-bank indicator.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Sgt. L. Havenhand.

MISSING, BELIEVED KILLED IN ACTION.—P/O. P. H. Conroy; Sqn. Ldr. J. Dugdale, D.F.C.; Sgt. A. B. Harper; Sgt. D. F. A. Hobbs; Sgt. J. F. King; Sgt. J. Lewis; Flt. Lt. J. H. Manley; Sgt. A. H. Marshall; Sgt. E. R. Norburn; Sqn. Ldr. T. P. Pugh, D.F.C.; Sgt. R. Shelton.

MISSING.—Flt. Sgt. E. F. Allwright; F/O. D. J. Anderson; Sgt. D. J. Audley; F/O. A. V. Aylott; Sgt. D. Barker; Sgt. E. C. A. Barnes; Sgt. E. A. Bartlett; Sgt. D. R. Bell; Sgt. E. Bell; Sgt. D. J. Beesley; Sgt. F. Berry; F/O. E. G. Birkbeck; Sgt. B. J. Bond; Sgt. E. Bracken; F/O. A. E. Bransgrove; Act. Flt. Lt. J. R. Brind; Sgt. F. C. Brown; P/O. C. E. Burras; Sgt. J. D. H. Carleton; Sgt J. C. Carpenter; Sgt. A. E. Chalk; Sgt. R. A. Cole; Sgt. H. M. Cornes; Sgt. R. Cowell; Sgt. J. Crammond; Sgt. A. B. Cresswell; Sgt D. E. Croft; Sgt. D. E. Dalton; P/O. F. De Villiers; Sgt. W. J. Dowell; Sgt. J. P. Doyle; Sgt. L. J. Dugard; Sgt. A. G. Elcox; Sgt. P. C. Evans; F/O. P. J. S. Evans; Sgt. J. Ferguson; Flt. Sgt. A. Fletcher; Sgt. W. J. Ford; Sgt. E. C. Fox; Sgt. F. J. Frost; Sgt. H. T. Furniss; Sgt. J. W. Gale; Sgt. A. Garner; Sgt. A. J. Gardner; Sgt. A. N. Gibbons; Sgt. J. C. Gibson; Sgt. A. A. Goldstone; Sgt. D. Hadwin; Sgt. J. Hamilton; Sgt. J. F. Harper; Sgt. G. A. Hodges; P/O. G. J. Homersham; Sgt. G. H. Irons; Sgt. F. J. Jackson; F/O. P. R. Johnson; Sgt. R. L. Jones; Sgt F. Keep; Flt. Sgt. B. G. Knoesen; Sgt. H. B. Knowles; Sgt. T. Lancaster; Sgt. C. R. Langley; F/O. R. Lyon; Sgt. G. W. McKenzie; Sgt K. H. G. McLennan; Sgt. F. E. McMackin; Sgt G. S. Maddocks; F/O. G. Mathews; Sgt. H. Morris; Sgt. H. Nelson; Sgt. E. G. Nickels; Sgt. J. H. O'Farrell; Sgt. T. L. Omerod; Sgt. J. P. Padley; Flt. Sgt. G. A. N. Parker; Sgt. J. W. Pothecary; F/O. E. A. Povey; Sgt. A. B. Radcliffe; Sgt. W. L. Reed; F/O. I. J. Roberts; Sgt B. Robinson; F/O. R. C. Ross; Sgt. R. F. Russell; Sgt. S. V. Sherrington; Sgt. E. D. Slade; P/O G. S. Smith; Sgt. R. S. Smith; Sgt. W. R. Smyth; Sgt. P. F. Snape; Sgt. J. L. Snelling; Sgt. C. C Soang; Sgt. W. J. Spence; Sgt. M. Spencer; Sgt R. B. Spencer-Fleet; Flt. Sgt. R. Spooner; Sgt E. A. Stevens; F/O. G. Such; Sgt. J. A. Suffield; F/O. J. O. P. Tanner; Sgt. R. E. Taylor; Flt Sgt. A. N. Tennant; P/O. A. J. Thomas; P/O. R. K. Thompson; Flt. Sgt. H. Turner; Flt. Sgt. H. J. Walker; Sgt. L. E. Walters; F/O. S. A. Walton; Sgt. C. Watkin; Sgt. C. H. W. Watts; Sgt. R. Webb; Sgt. L. D. West; P/O. J. N. Whitehouse; P/O. D. Williams; Sgt. J. R. Williams F/O. K. Wilson; Sgt. D. W. Woods; Sgt R. Worrall.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Sgt. R. C. M. Parris.

KILLED ON ACTIVE SERVICE.—Sgt. R. J. Dickson; L.A/C. E. Easthope; F/O. J. T. Gilbert; A/C.1 J. J. Hendrick; F/O. P. R. B. Littlewood; Sgt. H. G. O. Webb; F/O. I. A. L. Stewart.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED

KILLED ON ACTIVE SERVICE.—Sgt. R. C. Carrington.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Flt. Lt. G. R. Dixon; Sgt. J. McG. Hart; Sgt. N. H. Johnson; L.A/C. W. E. Jones; P/O. B. M. Twilley.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Sgt. W. S. Roberts.

DIED ON ACTIVE SERVICE.—L.A/C. C. P. Anken; L.A/C. R. S. Cropper; L.A/C. R. J. Davies; F/O. J. Duffy; A/C.1 M. C. Elsden; Sgt. H. J. R. Fisher; L.A/C. L. A. Hatley; Sgt. J. N. Swann; L.A/C. D. H. Walker.

Women's Auxiliary Air Force

DIED ON ACTIVE SERVICE.—A/CW.2 W. E. Standing.

Royal Australian Air Force

KILLED IN ACTION.—Flt. Sgt. C. H. MacKie.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. J. M. O. Harris.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. J. C. O'Neill; F/O. P. W. Rowling; F/O. C. W. Walker.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Sgt. D. G. Evans; Flt. Sgt. G. A. Rourke; Flt. Sgt. R. W. Westerberg.

MISSING.—F/O. C. B. Anderson, D.F.C.; Flt. Sgt. T. E. Bent; Sgt. G. R. Clark; P/O. H. L. Fuhrmann; Flt. Sgt. A. W. H. Gliddon; Flt. Sgt. R. G. Perrett; P/O. S. N. Scott.

KILLED ON ACTIVE SERVICE.—Sgt. R. N. P. Brown; Flt. Sgt. W. W. Evans.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—F/O. D. L. McGregor.

Royal Canadian Air Force

KILLED IN ACTION.—Sgt. C. M. Binnie; Flt. Sgt. A. L. Bjarnason; P/O. P. G. Heden; P/O. G. A. Souch; F/O. F. R. Taylor; Sgt. R. J. Wilson.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. R. A. Bendwig; Sgt. D. G. Hackett; Sgt. E. J. Haid; F/O. M. M. Liebeck; Sgt. W. J. Mollard; Sgt. C. J. Neubert; P/O. R. D. Reesor; F/O. F. E. Wickstrom.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. R. C. Broadbent; F/O. R. M. Christie; P/O. K. M. Reid; Sgt. D. I. Shaw.

MISSING.—Sgt. L. L. Dunbar; Sgt. R. G. Edwards; P/O. J. D. Golds; Sgt. E. F. Henry; F/O. W. J. Irwin; F/O. G. J. Lawrence; Flt. Sgt. A. E. Leake; F/O. C. H. McMinniman; P/O. C. Shnier.

KILLED ON ACTIVE SERVICE.—F/O. L. Anderson; Sgt. W. Balduff; F/O. R. B. Delbridge; F/O. W. J. Marshall; Act. Flt. Lt. E. A. Murray.

DIED ON ACTIVE SERVICE.—Act. Flt. Lt. T. K. Ibbotson.

Royal New Zealand Air Force

KILLED IN ACTION.—Flt. Sgt. J. H. Keeley.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. A. J. V. Hunt; Sgt. J. A. McDonnell; P/O. H. F. B. Smith.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Sgt. J. F. Bowman.

MISSING.—P/O. F. W. R. Cumpsty; P/O. N. McDonald.

South African Air Force

MISSING.—Lt. M. H. Davids; Lt. M. Isenberg.

WOUNDED OR INJURED ON ACTIVE SERVICE.—2/Lt. E. F. Kirsten.

Casualty Communiqué No. 297.

Of the names in this list 94 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Sgt. E. Causer.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. I. W. Arnold; Sqn. Ldr. P. M. V. Lysaght; F/O. J. H. C. Mellwrick.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. H. C. Adkins; Sgt. L. G. Alexander; Sgt. D. Alford; Sgt. R. Allan; F/O. D. J. Appleton; Sgt. E. Bance; P/O. K. Bannerman-Pillai; Sgt. J. L. E. Barden; Sgt. H. A. Bastick; Flt. Lt. F. B. Bassett; Sgt. T. W. Brock; F/O. A. N. Bulpitt; Sgt. F. R. W. Checketts; Sgt. A. J. Clover; Sgt. P. B. Copp; Sgt. L. Cox; Flt. Sgt. R. W. Davison; Sgt. W. E. Debeurier; Sgt. P. S. Fisher; Sgt. R. W. Goffin; Sgt. G. Guerrier; Sgt. D. V. Gwilliam; Sgt. C. E. Hagan; Sgt. K. Hall; Sgt. J. H. Halliwell; Sgt. E. G. Harrold; Sgt. H. B. Hill; Sgt. R. Hordon; Flt. Lt. R. A. Jackson; Sgt. J. C. Jacques; Flt. Sgt. J. Kiernan; P/O. O. T. P. King; P/O. A. W. Lane; Sgt. R. F. Lillywhite, D.F.M.; Sgt. E. C. Mantell; Sgt. S. A. Miller; Sgt. H. J. Naylor; Sgt. R. G. Oliver; Sgt. W. K. D. Page; Flt. Sgt. H. A. Ross-Thomson; Sgt. F. Saunders; Sgt. R. Skelton; Sgt. T. E. Thompson; Sgt. I. C. Traill; Sgt. S. D. Wall; Sgt. C. A. Weymouth; Sgt. R. Williams; P/O. C. K. Wood; P/O. S. R. Young.

MISSING.—Sgt. R. H. Amstell; Sgt. O. M. Atkins; Sgt. R. Baird; Sgt. H. C. Baker; Sgt. S. Barnes; Flt. Sgt. R. J. H. Barron; Sgt. J. D. Bates; Sgt. G. W. Bentley; Sgt. R. Booth; P/O. J. D. S. Cable; Flt. Sgt. P. J. Capon; Sgt. S. J. Cassel; Sgt. E. Cavanagh; Sgt. A. C. R. Chapman; Sgt. J. J. Corbett; Sgt. D. G. Cox; Flt. Sgt. R. Crossley; Flt. Sgt. L. A. Davies; Sgt. F. P. Davis; Sgt. D. Deans; P/O. R. J. R. Docker; P/O. D. D. Donkin; P/O. I. S. Dunbar; Sgt. L. T. Evans; Sgt. G. A. Fifleul; Sgt. E. G. Francis; Sgt. J. Francis; Sgt. L. F. Gilkes; Sgt. J. K. Gilvary; Flt. Sgt. T. H. Gittins; Sgt. K. F. Goode; Sgt. W. H. Greaves; Sgt. S. P. Hawkes; Sgt. L. C. Hayward; Sgt. S. E. Hillman; Sgt. G. Hopkins; Flt. Sgt. P. J. Horsham; Sgt. L. F. Howard; Sgt. J. T. Hubbard; Sgt. S. W. James; Sgt. F. W. Jeffrey; Sgt. R. H. Jones; Sgt. S. T. Kitching; Sgt. R. Laughton; Sgt. C. N. Lee; Sgt. J. Lee; Sgt. T. M. Leonard; Sgt. P. Lowe; Sgt. L. Lucas; Sgt. L. G. Lythgoe; F/O. T. McCall; Sgt. W. D. McDonald; Wing Cdr. J. McGhie; P/O. J. Mackenzie; Flt. Sgt. R. R. P. Mackenzie; P/O. H. R. Madgett; Sgt. R. Major; Sgt. R. Matthews; Sgt. F. Meaker; Sgt. P. W. Mitchell; Sgt. W. A. Mitchell; F/O. F. D. Norton; Sgt. P. J. O'Donnell; Sgt. S. G. Palk; Sgt. J. L. Paterson; Sgt. H. Price; Sgt. I. W. Pugh; F/O. F. R. C. Pugh; Sgt. E. C. Ramm; Sgt. C. E. Rashley; Sgt. D. P. J. Rawlings; Sgt. R. Reid; Sgt. F. J. Richards; P/O. H. Robinson; F/O. J. A. Rogers; P/O. F. Saunders; F/O. G. W. Scammell, D.F.C.; Sgt. H. J. Shaw; Sgt. J. H. Shaw; Sgt. A. W. A. Souter; F/O. P. J. Sparkes; F/O. A. E. Stocker; Sgt. C. E. Taylor; Sgt. C. W. Torbett; Flt. Sgt. J. Trotter; Sgt. A. E. Turner; Sgt. T. Underdown; P/O. J. J. Wakefield; P/O. J. Weaver; Sgt. J. S. Webb; Sgt. W. M. Welsh; Sgt. C. P. Williams; Flt. Lt. R. G. Winnicott; Sgt. S. W. Wood; Sgt. D. A. Young.

KILLED ON ACTIVE SERVICE.—Flt. Sgt. R. S. Brothwell; L.A/C. T. N. Cooke; F/O. L. J. Crouch; L.A/C. D. Daly; L.A/C. L. Hobbs; Sgt. E. Saxon; Sgt. J. A. Van-Lint.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—P/O. T. Adamson; Sgt. E. J. Harrild.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—P/O. C. G. Fox; P/O. A. W. Lawrence; Sgt. R. E. Luckock.

WOUNDED OR INJURED ON ACTIVE SERVICE.—A/C.1 C. Harrison; L.A/C. H. Pattinson; Sgt. J. Smith.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Cpl. H. McC. Montgomerie; F/O. A. A. Williams.

DIED ON ACTIVE SERVICE.—A/C.1 G. W. Bickley; L.A/C. A. E. Britain; Cpl. A. J. Crocker; L.A/C. E. F. Day; L.A/C. C. Hamlin; Cpl. T. F. Harvey; L.A/C. J. F. S. Hole; Cpl. J. A. Mackintosh; L.A/C. P. P. Naughton; L.A/C. J. Singleton; A/C.1 H. A. Stone.

SERVICE AVIATION

The crest of No. 45 Squadron. The motto "Per Ardua Surgo" means "Through difficulties I arise."

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Sgt. F. H. Berkeley; Sgt. A. J. Fuge.

Women's Auxiliary Air Force

DIED ON ACTIVE SERVICE.—L.A/CW. K. E. Cooper.

Royal Australian Air Force

KILLED IN ACTION.—Flt. Sgt. F. M. Gilkeson.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. L. J. Hammond; Act. Flt. Lt. J. C. McI. Rose, D.F.C.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. B. W. Kearney; Flt. Sgt. L. A. Morgan; Flt. Sgt. J. F. Thomas.

MISSING.—Flt. Sgt. E. R. Biggs; F/O. H. R. D. Budd; Flt. Sgt. J. R. Chapman; F/O. J. M. Curtis; Flt. Lt. K. G. Fry; Sgt. J. E. Fryer; Flt. Sgt. H. O. Hillier; Flt. Sgt. A. J. Hogan; Flt. Sgt. F. F. Innes; Sgt. A. M. Lovelle-Draper; Sgt. H. B. Lydeamore; Flt. Sgt. R. C. McBean; Sgt. M. J. McMahon; Sgt. D. M. Macpherson; Flt. Sgt. M. G. Medhurst; Flt. Sgt. R. W. Park; Flt. Sgt. S. T. Pekin; Flt. Sgt. D. A. Reid; Sgt. D. Russell; F/O. C. B. Smith; Flt. Sgt. A. N. Vidler; P/O. A. M. Welch; Sgt. F. E. Worden.

KILLED ON ACTIVE SERVICE.—F/O. J. H. W. Johnstone; Flt. Sgt. E. D. Lee; Flt. Sgt. D. J. O'Keefe; F/O. A. F. Shapcott.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Flt. Sgt. J. A. Heaven.

Royal Canadian Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. J. E. Cloutier; P/O. D. M. Crozier, D.F.M.; Sgt. C. B. Featherstonaugh; F/O. R. Harvie; Sgt. L. C. King; Flt. Sgt. J. A. Moore; Sgt. R. W. Rea; Sgt. J. W. Smith; W/O. L. O'N. Weakley; Sgt. A. W. Wilson.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. D. M. Brackenbridge; F/O. G. Cherniuk; F/O. C. G. Cumming; Flt. Sgt. W. A. Dobson; Sgt. C. C. D. Fraser; Sgt. J. E. R. Giguere; Sgt. H. E. Heath; Sgt. H. D. Lewis; Sgt. W. H. Lough; Flt. Sgt. D. W. Smith; Flt. Sgt. J. G. R. Trough.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Sgt. C. P. Fitzpatrick.

MISSING.—F/O. M. E. Balkam; P/O. J. M. L. Bouvier; P/O. R. Bradley; Sgt. C. A. Brown; P/O. S. F. Chudzik; F/O. I. L. Colquhoun; Sgt. G. R. Connor; Sgt. J. W. Dally; Sgt. H. P. Gaudry; P/O. E. G. D. Gawthrop; F/O. S. M. Heard; Sgt. R. C. Jordan; Sgt. T. Y. Kirkham; Flt. Sgt. J. P. C. Lapointe; P/O. J. M. Lewis; P/O. D. R. C. McDonald; Sgt. W. L. McKinnon; Sgt. P. O. McSween; P/O. O. A. O'Leary; P/O. F. J. Piper; Sgt. J. I. R. R. Renaud; F/O. G. C. Robinson; Sgt. I. S. Rothstein; Act. Flt. Lt. D. D. Shuttleworth, D.F.C.; Sgt. D. Thornton; Sgt. R. Urquhart; Sgt. G. S. Walter.

KILLED ON ACTIVE SERVICE.—Sgt. F. Belcourse; Sgt. R. H. Chisnell; P/O. A. T. Duke; Sgt. G. W. Holditch; Sgt. F. D. Johnson; Sgt. J. C. Roulston; Sgt. J. Taylor.

DIED ON ACTIVE SERVICE.—L.A/C. R. A. McMaster; L.A/C. C. E. Martell.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Sgt. L. R. Fadden; Sgt. L. C. McCracken; Sgt. J. F. Selman.

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. C. D. Lamont.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. N. Bruce; P/O. J. McCullough; Sgt. L. E. Moss; Sgt. T. A. Murphy; Sgt. W. J. Veysey.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Sgt. L. D. Lory.

MISSING.—Flt. Sgt. L. F. English; Flt. Sgt. H. Harries; Flt. Sgt. J. R. Mayo; P/O. R. J. Mosen; F/O. H. I. Spiers; Flt. Sgt. J. L. Talbot.

KILLED ON ACTIVE SERVICE.—F/O. L. N. Buttimore; Flt. Sgt. S. R. Greer.

South African Air Force

KILLED IN ACTION.—Lt. F. A. Handley; Flt. Sgt. V. P. Roberts; Lt. R. A. Simpson; Flt. Sgt. K. O. Shepperson.

MISSING.—Capt. P. Daphne; Flt. Sgt. M. J. Jonker; Act. Air Sgt. E. E. Lambert; Flt. Sgt. C. W. Lehmac; Lt. A. D. Ridges; Lt. W. M. Trembath; 2/Lt. L. A. Van Zyl.

Official Corrections

Casualty Communiqué No. 284.

It is regretted that L.A/C. W. H. S. WILLIAMS was erroneously reported as "DIED ON ACTIVE SERVICE."

Casualty Communiqué No. 293.

R.A.A.F., under "MISSING" delete Sgt. C. J. Goddard.